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NEWS

The Burn Scars of the Sierra Foothills Tell a Story — and Offer Lessons

By Danielle Venton Nov 28

Light streams through an area burned by the Mosquito Fire at the UC Berkeley Blodgett Forest Research Station in Georgetown, Calif., on Oct. 28, 2022. *(Beth LaBerge/KQED)*

Blodgett Forest Research Station sits about 30 miles west of the southern tip of Lake Tahoe, amid commercial timber and U.S. Forest Service lands. A place for foresters and scientists to experiment with the care and management of forested lands, Blodgett is a prime study site because it's representative of much of the forested Sierra — all the old growth trees were effectively logged out in the late 1800 and early 1900s. Mostly second growth exists now.

Researchers have practiced varying harvesting, thinning and prescribed burning techniques in study plots here since the 1930s, when the land was gifted to the University of California by a private timber company. One focus area of study is how to manage forest lands to be resilient to wildfire. Some of this is "really cutting edge stuff," says research scientist Brandon Collins.

Blodgett: No Stranger to FirePrior to the Gold Rush, the Blodgett area was a typical mixed-conifer forest, with white fir, Douglas fir, ponderosa pine, sugar pine, incense cedar and California black oak, a hardwood. Here, as throughout the Sierra Nevada, Native people regularly set fire to the land to enhance deer and game habitat and for other benefits.
Before the 1849 Gold Rush, fire moved through the forest around every 10- to 12 years, sometimes as frequently as every two years. Starting in the 1890s, parts of the Blodgett forest were logged by oxen teams, later replaced with steam equipment. Almost all of Blodgett, as well as almost all of the Sierra, was logged during the last century. Loggers especially prized pine trees.

What sprouts now from the forest floor is primarily second growth cedars and firs — trees that tolerate shade and crowding but are particularly vulnerable to fire and drought. The property was gifted to the University of California by a private timber company almost 90 years ago.

For the past 90 years, all fires on Blodgett have been intentionally set — carefully managed by people trained to bring them under control quickly if needed. That changed in September, when the Mosquito Fire, which started near a PG&E line on Sept. 6, burned rapidly and crossed the northern boundary of Blodgett on the morning of Sept. 9. The cause of the fire is still under investigation.

Blodgett staff had already been evacuated from the area for safety. The fire was considered fully contained on Blodgett by Sept. 11. It burned around 100 acres of the 3,000-acre property. All told, the Mosquito Fire burned 77,000 thousand acres in Placer and El Dorado counties.

While the fire damaged control plots for some long-term studies, it opened other opportunities for research. It also underlined the importance of preparing California's forests for fires.

Save trees from fire by lighting fires?

Brandon Collins stands in front of what was recently a hillside of young trees, now burnt to blackened crisps by a wildfire. When these trees were alive, the trunks were barely the diameter of an arm or a calf. They now look like a crowd of knobby, emaciated skeletons. They are of no economic value and, unless replanted, risk becoming a field of brush rather than regrowing as a forest.

"I think about, if we go back in time, what could we have done differently to change the outcome?" asks Rob York, co-director of Berkeley Forests, which manages the study site. This area was clear-cut a few decades ago and left alone ever since. "It's tricky, right? They're vulnerable because they're short trees. It doesn't take a lot of fire intensity to cause a high-severity fire."

Land managers at Blodgett could have thinned it with chain saws or a masticator (which is like a wood chipper on a tractor). Both of these options are tremendously expensive, up to $2,000 an acre, with no monetary return — placing them out of reach for almost all land managers, especially those managing for a commercial timber harvest to turn a profit.

Ariel Roughton, research forest manager at Berkeley Forests, displays a map of the Mosquito Fire at the Blodgett headquarters. Each solid color is the progress of the fire within a single day. *(Beth LaBerge/KQED)*

Industrial timber managers sometimes spray herbicide (PDF) to kill competing vegetation in young stands of trees, again at a price. But the practice is unpopular among neighboring communities and can sicken exposed people.

Theoretically, some of the thinned material could be harvested as biomass and incinerated in a cogeneration facility, with profits from energy generation defraying the cost.

“But in this area and much of the Sierras,” says Ariel Roughton, research forest manager at Berkeley Forests, “that is not a viable option because the infrastructure doesn't exist. [...] There's not really a lot of good answers.”

Research on increasing forest resilience could not be more timely, with many acres of industrial timberland in the state looking similar — young trees growing back after a clear cut— and with the state’s wildfire problem accelerating in an era of climate change, drought and fire suppression. Over the coming years, the economic calculus of what makes financial sense for a timber company might change.

“If I could go back in time, I would go back two years ago and do a prescribed fire here,” says York, who is piloting this approach currently at Blodgett. “But it is hard to pull off a prescribed fire in this kind of [young forest] structure.”

Just the day prior to this interview, he conducted a prescribed burn in a forest that looked similar to this stand of trees pre-wildfire. Doing such a fire kills off and consumes some of the trees that could make for a future profit, but it can also inoculate the stand against being entirely destroyed by future fires.

“Nobody’s talking about putting [prescribed] fire in 30-year-old stands. It’s taboo, by the way, for classic forestry,” says Collins. “You'd be burning some of your crop and there are lots of risks and difficulties with doing fire. But maybe if fire loss increases, it'll start to look more viable.

“This is kind of leading a way to a new frontier in forest management.”

Sometimes it works, sometimes it doesn't

A few hundred feet away, over a dirt road, a patch of forest looks quite different from this walking graveyard of small, skinny trees. The Mosquito Fire reached it, too, but then quieted down and became a "surface fire," burning along the ground instead of torching the crowns of the trees.

Last spring they did a prescribed fire there. Roughton relays what happened when the Mosquito Fire passed from the untreated forest area to the location with the recent prescribed fire.

“The [wildfire] came up in this direction and the intensity changed, right? It was high, high-intensity here. And then over on this side,” she said, indicating the other side of the road, “we did see the fire effects change. It still killed some of these trees along the edge, but it did then drop to the ground.”

In addition to saving trees, the calmer fire behavior allowed firefighters to lay lines of containment.

But up the road, around a large bend, is a patch of forest that had been diligently treated with beneficial fires. When the Mosquito Fire, running uphill, slammed into it, many trees, even large older ones, still died. Viewed from the road, the trees are mostly dead.

Brandon Collins, lead scientist at Berkeley Forests, speaks about the impacts of the Mosquito Fire and treatment effectiveness at the UC Berkeley Blodgett Forest Research Station. *(Beth LaBerge/KQED)*

"This is actually kind of a sad location for me," says York, "because I had done the two prescribed fires here in the past, but yet we still see dead trees up in the canopy."

Here, the researchers suspect the landscape had something to do with it. The fire had been making a long run uphill and crested like a powerful wave pounding ashore.

Fortunately, York says, deeper into the treated area, "we do start to see green trees. We saw the wildfire behaving like a low-severity fire caused by the prescribed fire we did."

Rob York is experimenting with techniques to make young tree stands more resilient to wildfire. *(Beth LaBerge/KQED)*

When wildfire is good fire

For the most part, the Mosquito Fire burned in a moderate, and even mild, way on Blodgett. In a low-intensity fire, stumps may be blackened but remain intact. In a moderate-intensity fire, stumps will be burned deep enough to form charcoal. In a high-severity fire, the stumps are gone.

“We were really fortunate that it didn't burn more of the property,” said Roughton. “It was, I think, a combination of our forest management, the weather helped us tremendously and then obviously the suppression folks who were out there.”

However, most of the acres that did burn don’t necessarily look too bad.

“One of the things that gets mischaracterized,” says Collins, “is the idea that a wildfire burns and it's all catastrophe, it’s all destroyed.”

In reality, he said, these forests are adapted to low- and moderate-severity fires. Even some patches of high-severity fire can be a benefit.

On the far left, some trees are still green thanks in part to a recent prescribed fire. In the foreground, swales wait to be deployed to reduce erosion in an area badly burned by the Mosquito Fire. *(Beth LaBerge/KQED)*

Test-driving new treatments

About a mile away, smoke is still rising like morning mist from a field, in a patch of forest. York burned it just the day before. It had looked similar to the high-density young forest seen at the start of the day, the one that burned up like a matchstick in the Mosquito Fire. Now, it’s opened up. You could walk through the stand without snagging your jacket on sticks.

“We let the fire kill all these small trees,” says York. “We just did it very cheaply and with an ecological process.”

A prescribed fire continues to smoke from several days prior at the UC Berkeley Blodgett Forest Research Station. *(Beth LaBerge/KQED)*

York will be studying how this stand responds to the fire and whether the expected timber harvest to come from it is much reduced, which he says is still an open question. Heat can kill some parts of the tree's crown and reduce growth. Yet, the additional space between trees may encourage bigger growth. This stand is also now less likely to be entirely lost in a future fire.

"I have some [forestry] friends who really focus on timber as their objective," says York. "I think they would like this outcome primarily for that reason. We let the fire kill all these small trees. And that was a pretty cheap way to do it."

KNPR's State of Nevada

New assessment looks to address climate change in Nevada

By Paul Boger

Published November 30, 2022 at 1:38 PM PST

AP Lake Mead

By now, most people realize climate change is real. A report by Clark County adds an exclamation point: it says we're facing a potential climate crisis.

This means the number of days above 115 degrees in the Las Vegas Metro area is projected to multiply by 10 over the next 80 years.

This year, Lake Mead fell below a water-intake pipe that feeds Las Vegas. There are two more. But the report says we should expect that lake to keep falling.

Less moisture also means more wildfires. And expect wilder swings in weather – and while though the number of floods might decrease, they could be bigger and stronger.

The report was put spearheaded by Clark County's Department of Environment and Sustainability. Sam Baker is the sustainability program administrator.

Guests: **Sam Baker,** sustainability program administrator, Clark County's Department of Environment and Sustainability; **Jeff Quinn**, public health preparedness
manager, Souther Nevada Health District and All-In advisory panel member; **Kara Steeland,** hydrologist, Truckee Meadows Water Authority

Paul Boger

Paul serves as KNPR's producer and reporter in Northern Nevada. Based in Reno, Paul specializes in covering state government and the legislature.

ENERGY & ENVIRONMENT

Smart meter monitoring can help conserve water — but not without a fight, researchers find

BY SHARON UDASIN - 11/30/22 3:33 PM ET

Istock

The use of smart meters to enforce water restrictions could encourage widespread conservation — but not without local backlash, a new study has found.

Amid California's ongoing drought, researchers partnered with the city of Fresno in summer 2018 to access and identify water violations via household meter data.

While a resulting surge in fines brought a dramatic reduction in both water use and violations, a barrage of complaints thwarted the program's survival, according to the study, released on Wednesday by the University of Chicago's Energy & Environment Lab.

"The urgency of the water challenge in the West requires such highly efficient tools," co-author Michael Greenstone, a professor of economics at the University of Chicago, said in a statement.

Yet policymakers "will need to carefully balance improved monitoring with community expectations and enforcement efforts," Greenstone acknowledged.

From July-September 2018, Greenstone and his colleagues piloted the automated enforcement of outdoor water restrictions for nearly 100,000 households in Fresno, where a total of 114,508 homes had meters installed at the time.

Even though the city's utility was a national pioneer in universal smart meter adoption, enforcement largely remained in the hands of "water cops" — workers who look for lawns that are being watered at prohibited hours.

During the three-month pilot program, however, the share of households fined for non-compliance increased from 0.1 percent to 14 percent, according to the study.

The ensuing shifts were drastic: a 17-percent decrease in total infractions and an 8-percent reduction in the number of households violating restrictions each month, the researchers found.

The authors also observed a 3-percent decline in water consumption over the three-month initiative, with households continuing to conserve even after the program concluded.

“The fact that households continued conserving water even after the summer, and even after the policy — and fines — ended, demonstrates that the policy was nudging behavioral changes in some households,” Ludovica Gazze, an assistant professor at the University of Warwick, said in a statement.

Had the policy been scaled-up, Fresno could have saved 394 million gallons of water annually — helping achieve the 20-percent reductions in water use that Gov. Gavin Newsom (D) has encouraged statewide, the study determined.

But this long-term program failed to materialize, leading the researchers to conclude that the program may have worked “too well.”

While many residents changed their habits, others were displeased, the authors explained.

During the three-month pilot, the number of households calling the local utility increased by 654 percent, while identifiable customer complaints rose by 1,102 percent, according to the study.

The resultant dissatisfaction ultimately led municipal officials to terminate the program, per the report.

“In practice, the city returned to relying on water cops and in-person inspections,” the authors wrote.

Prior to the program, water infractions “were rampant and punishments were rare,” the authors stressed.

In the summer of 2016, although 68 percent of households violated restrictions at least once, only 0.4 percent of those violations were sanctioned, according to the study.

Despite the monumental gains in conservation that the program achieved, the ensuing “political backlash caused Fresno to reverse its plan to scale automated enforcement of water use regulations citywide,” according to the study.

The city began by issuing a fine moratorium the day after the pilot concluded, the authors noted.

In April 2019, Fresno’s council then voted unanimously to lower maximum penalties from$200 to $100, as well as raise the permitted hours of outdoor water use and relax consumption thresholds, per the study.

The same vote also stipulated that fines could not be imposed based on meter readings —a move that was “effectively disallowing automatic enforcement,” the researchers contended.

“This experience serves as a cautionary tale about the limits of new technologies to solve compliance problems and underscores the need for research to identify the settings where they can succeed,” the authors stated.

The researchers stressed the importance of finding a compromise between political pressures and the integration of such technologies, rather than giving up on them.

“Policymakers should find ways to use this type of real-time data and bring their aging regulations into this century,” co-author Olga Rostapshova, executive director of the Energy & Environment Lab, said in a statement.

“Doing so may require a gradual shift and careful calibration of community expectations,” she added. “We hope to partner with more cities to test out different approaches to find the right balance.”

The Hill has reached out to the city of Fresno for comment.

NEWS & EVENTS

Western Snow Season 2022-23 Preview: A Look at Water Supplies and the Winter Outlook in 10 Maps

November 30, 2022
Author: NOAA/NIDIS

It's hard to overstate how crucial this snow season is for the western United States. Regions such as the West that receive a great deal of their precipitation in the form of snow face a number of challenges when snow droughts occur, including shrinking water supplies. And western water supplies are truly shrinking as some states are facing their second or third drought year in a row and a large part of the region is stuck in a 20+ year megadrought (https://www.drought.gov/research-spotlight-climate-driven-megadrought). Hanging over all of this is climate change–influenced aridification in the Southwest that is increasing evaporative demand, causing water supplies to dwindle from rising temperatures even when there is adequate precipitation. The two largest reservoirs in the U.S., Lake Mead and Lake Powell, are currently at the lowest levels since they were filled: both are below 30% of capacity. The two largest reservoirs in California, Lake Shasta and Lake Oroville, are at 31% and 27% of capacity, respectively.

Adding to the concerns this winter is that NOAA's Climate Prediction Center's seasonal outlook favors drier and warmer conditions for the southern part of the region, mostly based on a continuing La Niña pattern. This would be the third winter La Niña in a row for the United States.

The maps included here show how previous La Niña winters have impacted precipitation and temperature across the U.S., the latest National Weather Service outlooks that are influenced by these past La Niña events, and the water supply issues in the West, which will be greatly exacerbated if the winter outlooks come to fruition. Lastly, the latest snow conditions in the West are included, although it's very early to draw any conclusions from them.

Want to stay informed this snow season? NIDIS and its partners issue snow drought updates every 4 weeks from mid-December through June. **Subscribe to *Dry Times* (https://visitor.r20.constantcontact.com/manage/optin?v=001caaqJ6MjGFf-p73chvAwUZ7FJVELPsBFPtaPxgQBRo5TPRMYlTJgDN9ggwe8wDM4iOinVPxeYDxJlciwmvVfCrRCVMFaV3vNqI4iq4mFR_dmzOFndkekzc6NnFjbU4PAbjsUR2z3-rMo%3D)**, NIDIS's bi-weekly email newsletter, for the latest snow drought updates.

La Niña Impacts on Precipitation and Temperature

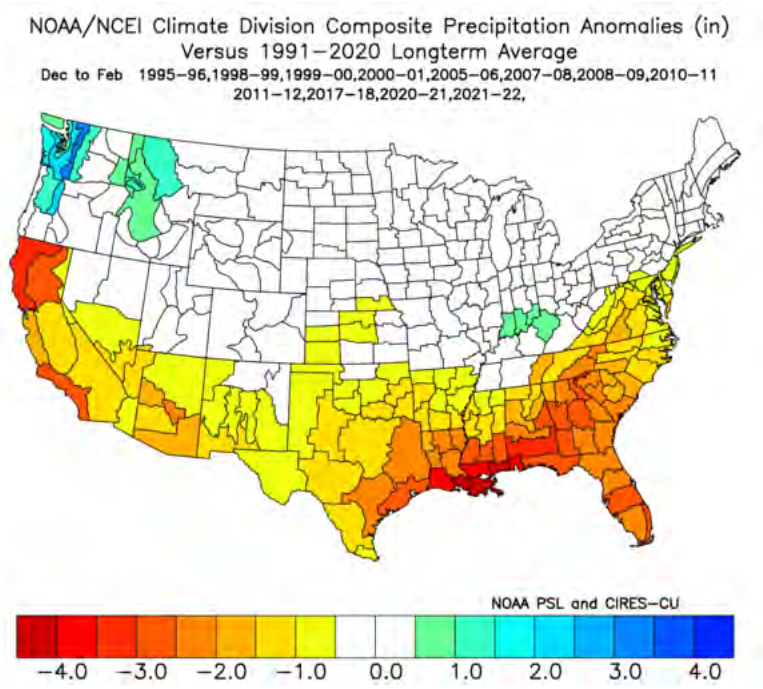


Figure 1: This image includes all La Niña events during the December-January-February (DJF) time period (12 total) going back to 1990, and compares the observed precipitation during the DJF time period with the 1991–2020 long-term average. As shown, the southern U.S. from coast to coast has had below-average precipitation for all the La Nina years put together. Parts of the Pacific Northwest and the Midwest have had above-average precipitation. Source: NOAA/NCEI data (https://psl.noaa.gov/cgi-bin/data/usclimdivs/climdiv.pl?variab=Precipitation&type=1&base=7&mon1=12&mon2=2&iy%5B1%5D=1995&iy%5B2%5D=1998&iy%5B3%5D=1999&iy%5B4%5D=2000&iy%5B5%5D=2005&iy%5B6% compiled by Victor Murphy with the National Weather Service Southern Region Headquarters.

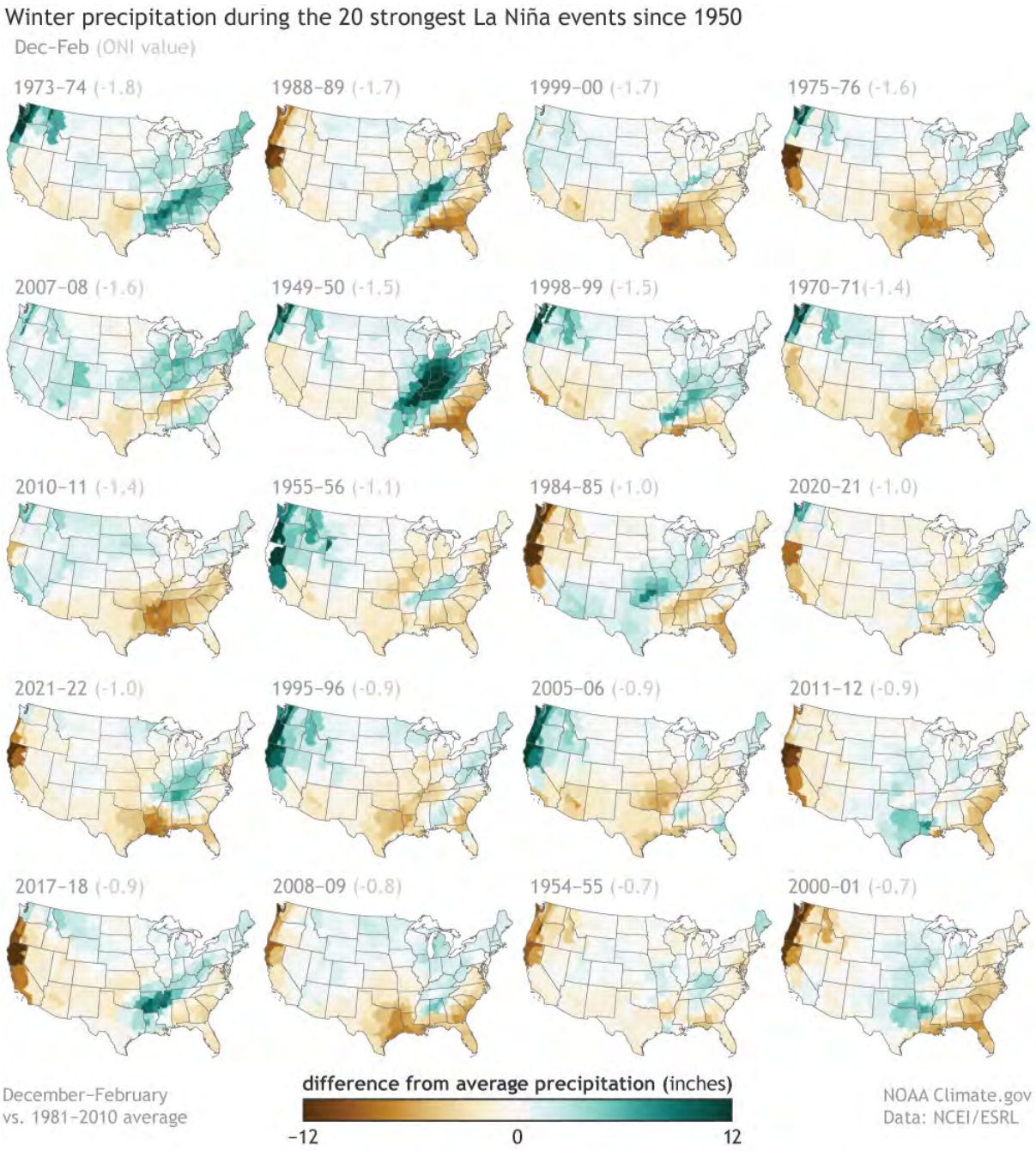


Figure 2: Winter precipitation patterns during each of the 20 strongest La Niña episodes since 1950. The strength is measured by the December–February Oceanic Niño Index (ONI) (https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php), which is three-month average surface temperature departure from normal in the Niño 3.4 region (https://www.climate.gov/news-features/blogs/enso/why-are-there-so-many-enso-indexes-instead-just-one). The December–February ONI for each episode is shown in parentheses (units of °C) above each map. The strongest La Niña episode is on the top left, and the weakest of the 20 episodes is on the bottom right. Source: NOAA Climate.gov, based on NCEI climate division (http://www.ncdc.noaa.gov/monitoring-references/maps/us-climate-divisions.php%2520%2529) data provided by NOAA's Physical Sciences Laboratory (http://www.esrl.noaa.gov/psd/data/usclimdivs/).

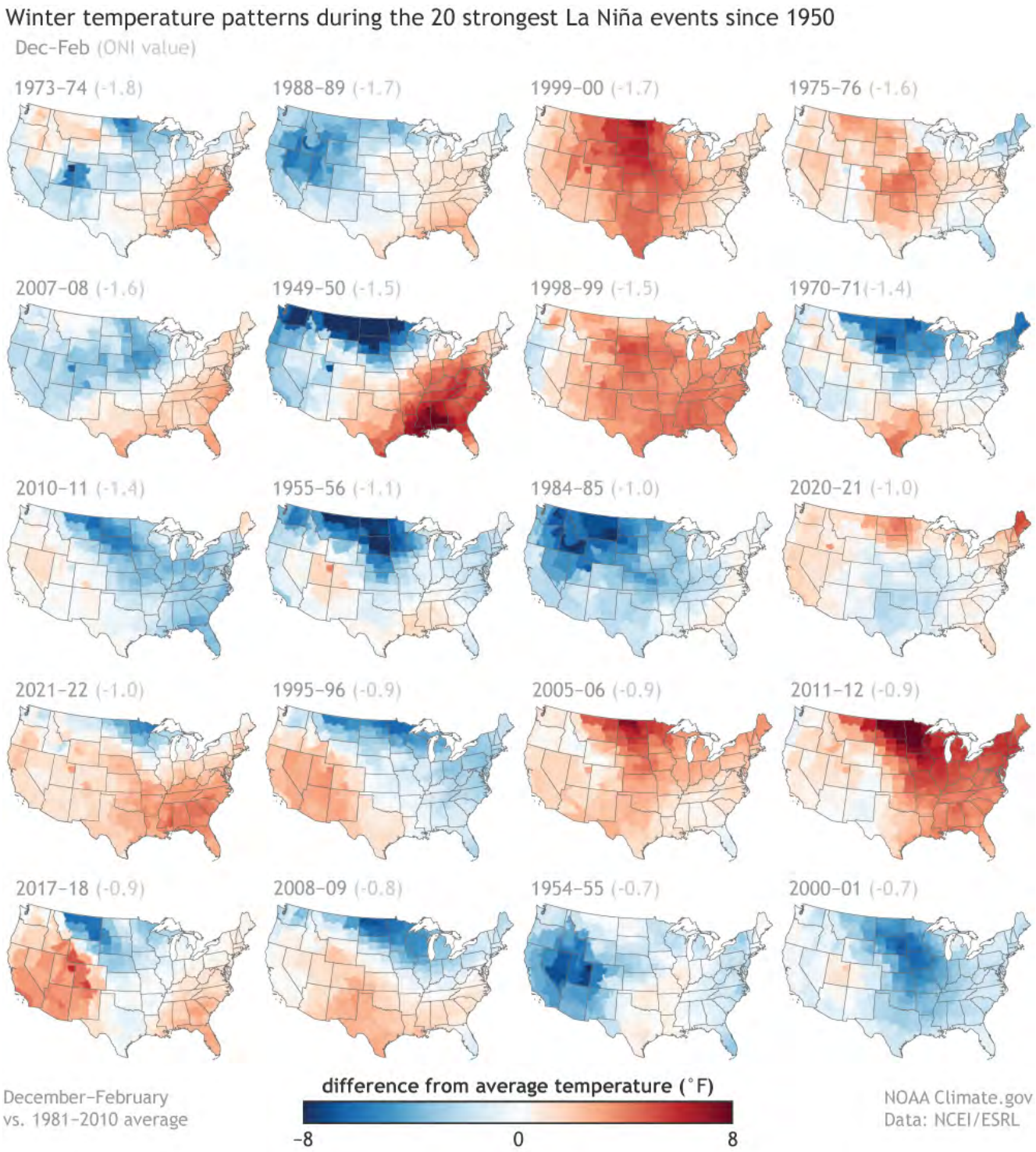


Figure 3: Winter temperature patterns during each of the 20 strongest La Niña episodes since 1950. The strength is measured by the December–February Oceanic Niño Index (ONI) (https://origin.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ONI_v5.php), which is the three-month average surface temperature departure from normal in the Niño 3.4 region (https://www.climate.gov/news-features/blogs/enso/why-are-there-so-many-enso-indexes-instead-just-one). The December–February ONI for each episode is shown in parentheses (units of °C) above each map. The strongest La Niña episode is on the top left, and the weakest of the 20 episodes is on the bottom right. Source: NOAA Climate.gov, based on NCEI climate division (http://www.ncdc.noaa.gov/monitoring-references/maps/us-climate-divisions.php%2520%2529) data provided by NOAA's Physical Sciences Laboratory (http://www.esrl.noaa.gov/psd/data/usclimdivs/).

National Weather Service/Climate Prediction Center's Seasonal and Monthly Outlooks

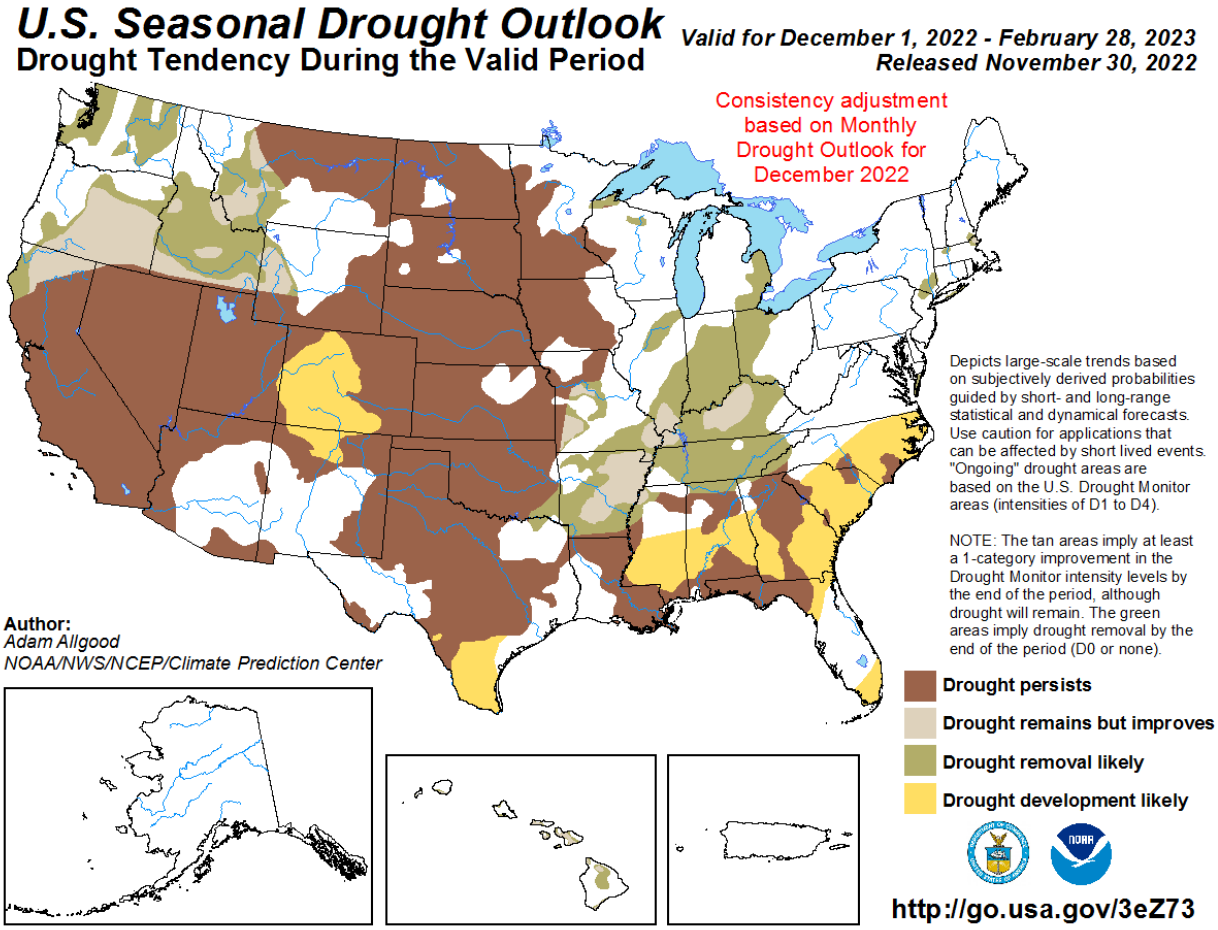


Figure 4: The seasonal drought outlook shows that a below-average peak wet season is anticipated for central to southern California and the Southwest, favoring drought persistence, while drought reductions are favored for the Northwest and northern Intermountain West. Little additional drought development is forecast for the Four Corners region due to lingering effects from a robust summer monsoon, though some development is favored for Colorado and northern New Mexico where initial conditions are considerably drier. Source: NWS Climate Prediction Center (https://www.cpc.ncep.noaa.gov/).

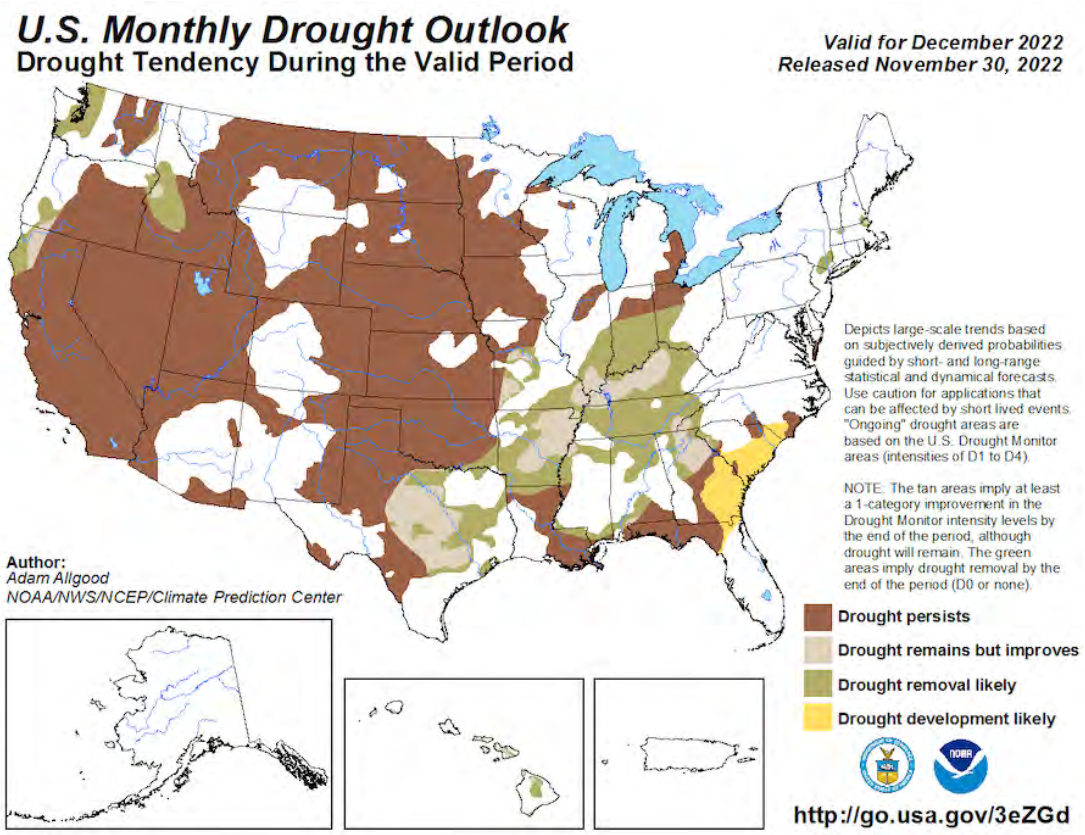


Figure 5: The December drought outlook calls for increased chances of above-normal precipitation throughout the northwest quarter of the contiguous U.S., supporting drought removal or improvement for the Pacific Northwest, parts of northern California, and the northern Rockies through the end of December. For the remainder of the West, long-term drought is most likely to persist on a monthly time scale. Source: NWS Climate Prediction Center (https://www.cpc.ncep.noaa.gov/).

Western Water Supplies

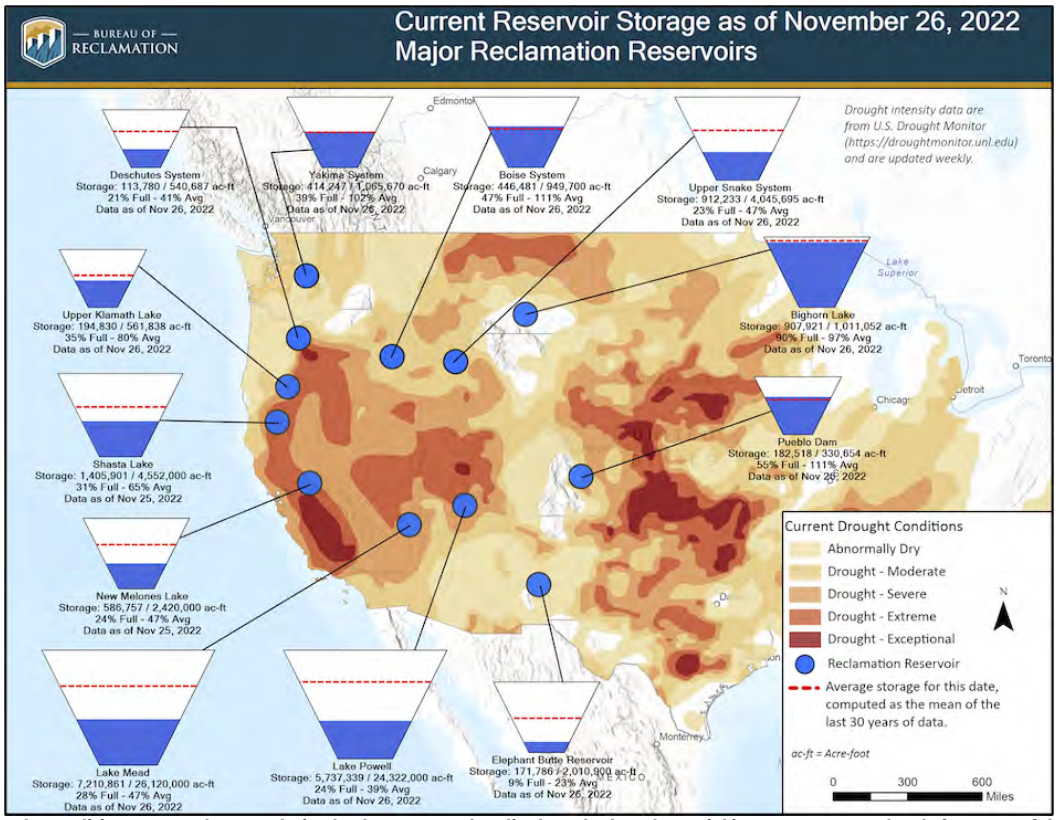


Figure 6: Drought conditions across the West dating back to 2020 and earlier have had a substantial impact on storage levels for many of the Bureau of Reclamation's reservoirs. With most facilities realizing below average inflows in the last two water years, storage across the West is also below average at many facilities. Across the West, multiple reservoirs have reached 30-year storage lows, including Lakes Mead and Powell. Source: U.S. Bureau of Reclamation (https://www.usbr.gov/lc/region/g4000/riverops/webreports/usbrTeacups.pdf).

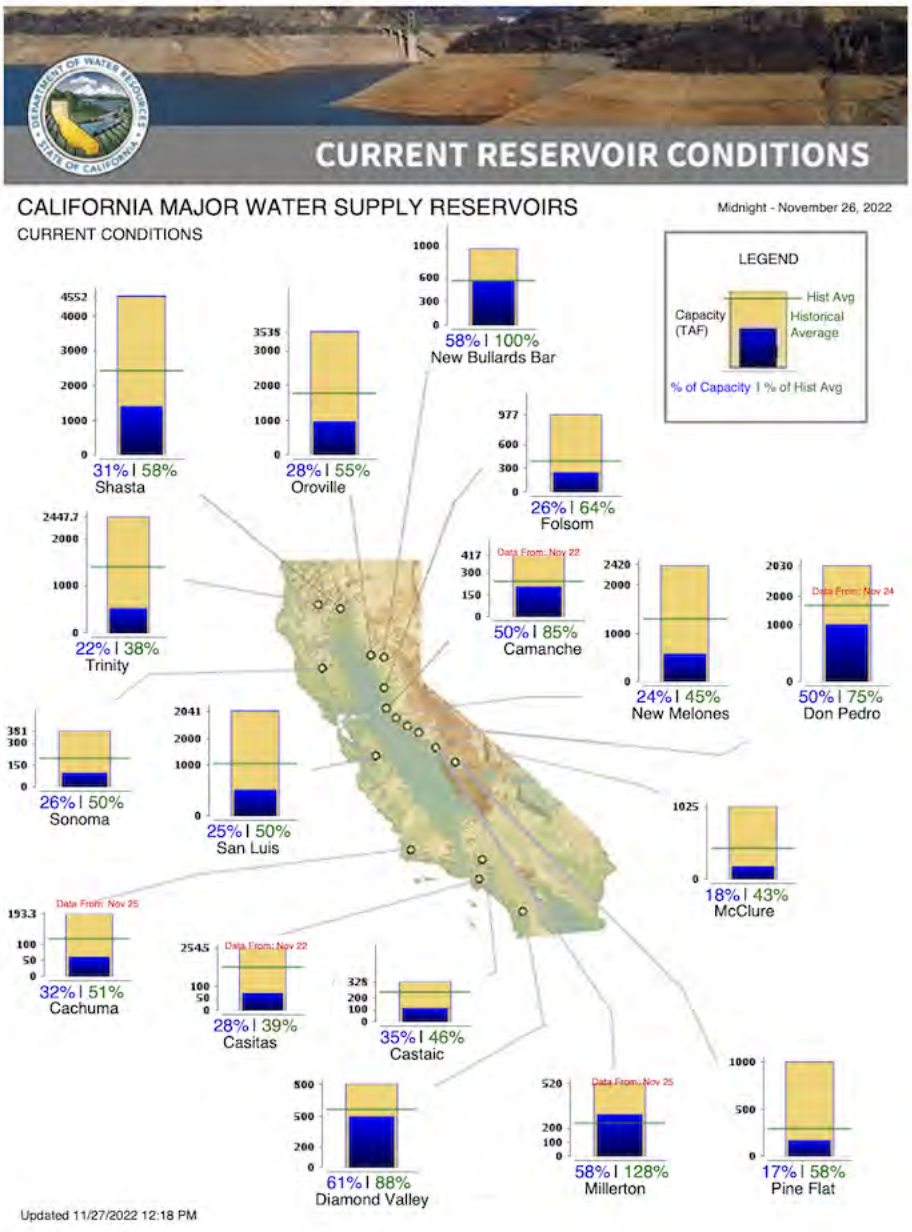


Figure 7: Long-term drought in California has left 15 of 17 major water supply reservoirs below their historical averages. Shasta, the largest reservoir in the state, is at 58% of average and only 31% of capacity. Source: California Department of Water Resources (https://cdec.water.ca.gov/resapp/RescondMain).

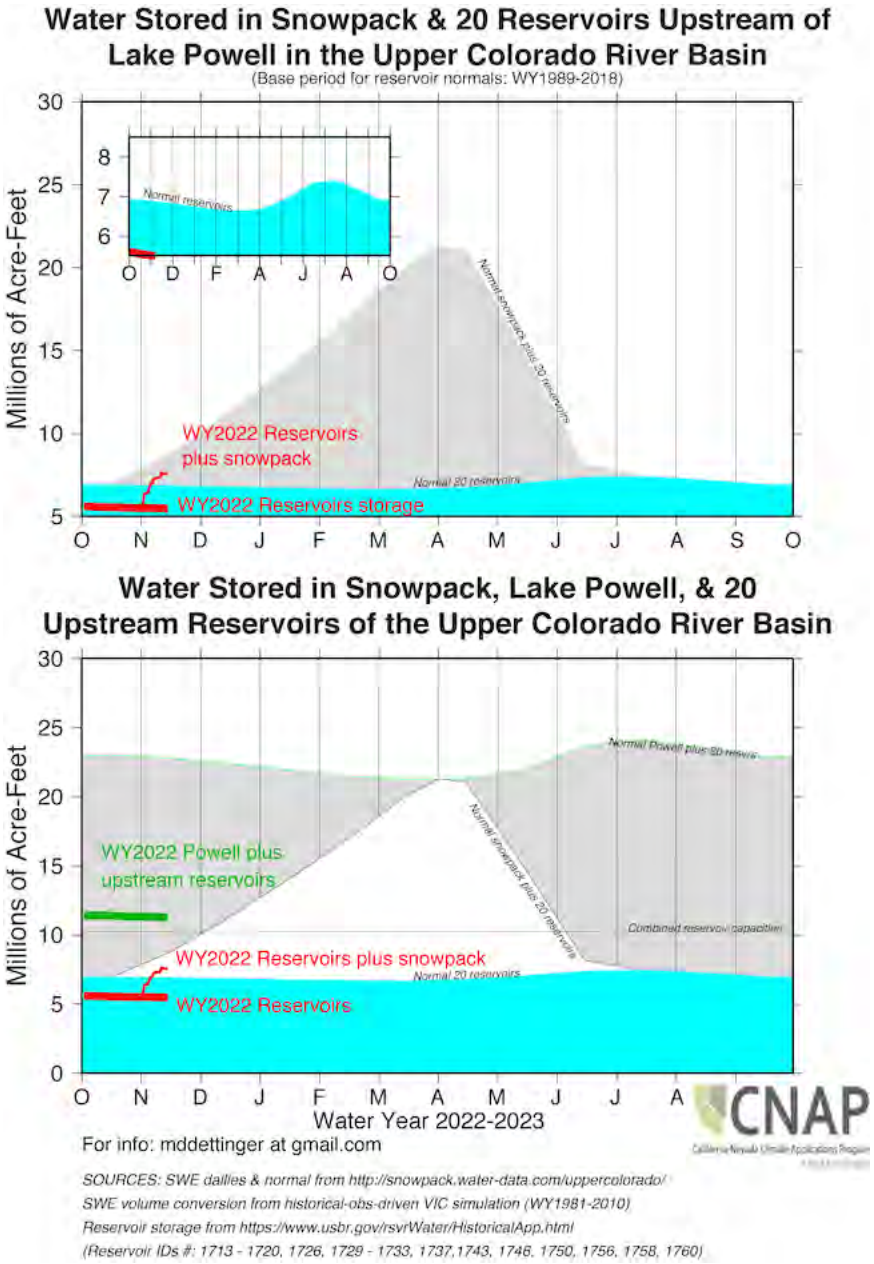


Figure 8: These graphics show the amount of water (in millions of acre-feet) stored in 20 long-reporting reservoirs above Lake Powell in the Upper Colorado River Basin, in snowpack above Lake Powell, and in Lake Powell. Lake Powell storage capacity is considerably greater than the total storage in the 20 reservoirs considered here, and is comparable to the long-term average yearly maximum volume of water stored in the snowpacks of the UCRB. Source: California Nevada Adaptation Program (https://cnap.ucsd.edu/storage_in_sierra_ucrb/) (a NOAA CAP/RISA team).

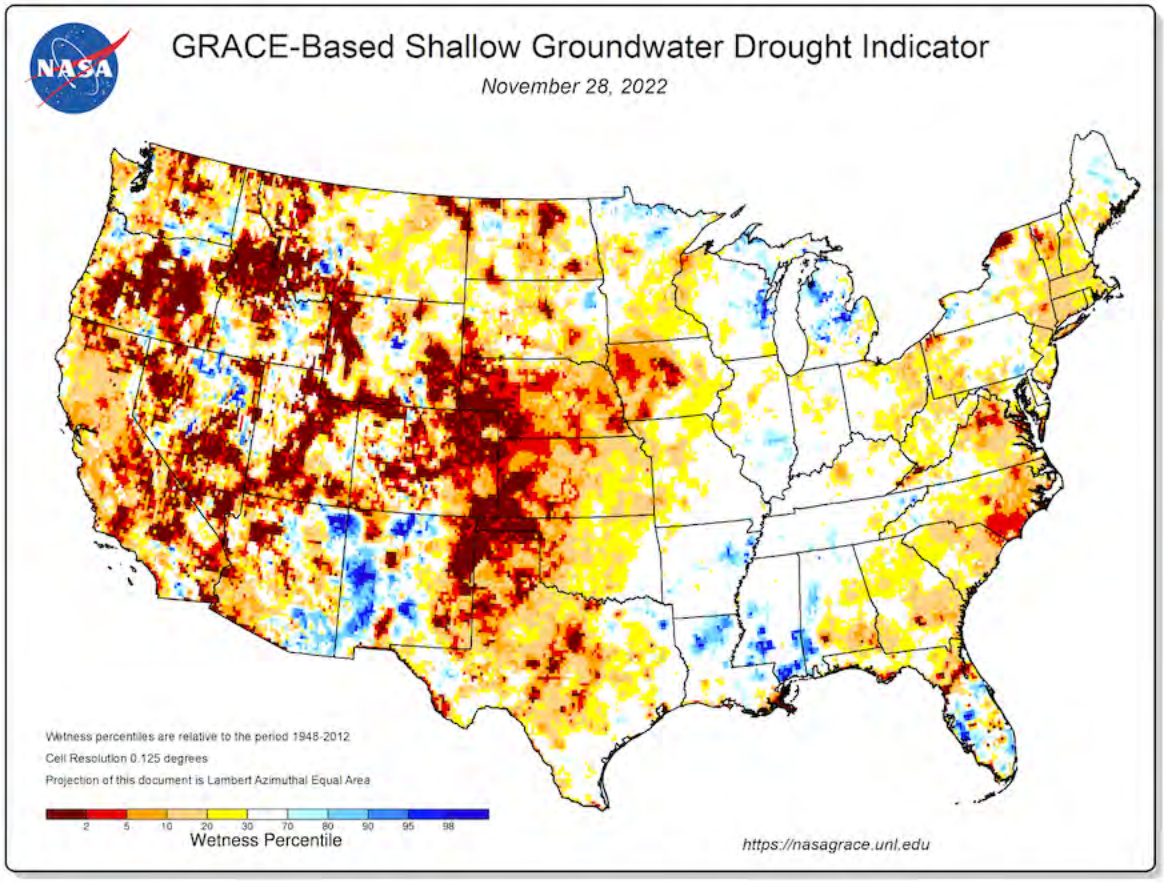


Figure 9: Scientists at NASA's Goddard Space Flight Center generate groundwater indicators each week. They are based on terrestrial water storage observations derived from NASA GRACE-FO satellite data and integrated with other observations, using a sophisticated numerical model of land surface water and energy processes. The drought indicators describe current wet or dry conditions, expressed as a percentile showing the probability of occurrence for that particular location and time of year, with lower values (warm colors) meaning dryer than normal, and higher values (blues) meaning wetter than normal. As shown on the map, shallow groundwater levels are low throughout most of the West. Source: NASA (https://nasagrace.unl.edu/), University of Nebraska – Lincoln.

Latest Snow Drought Conditions

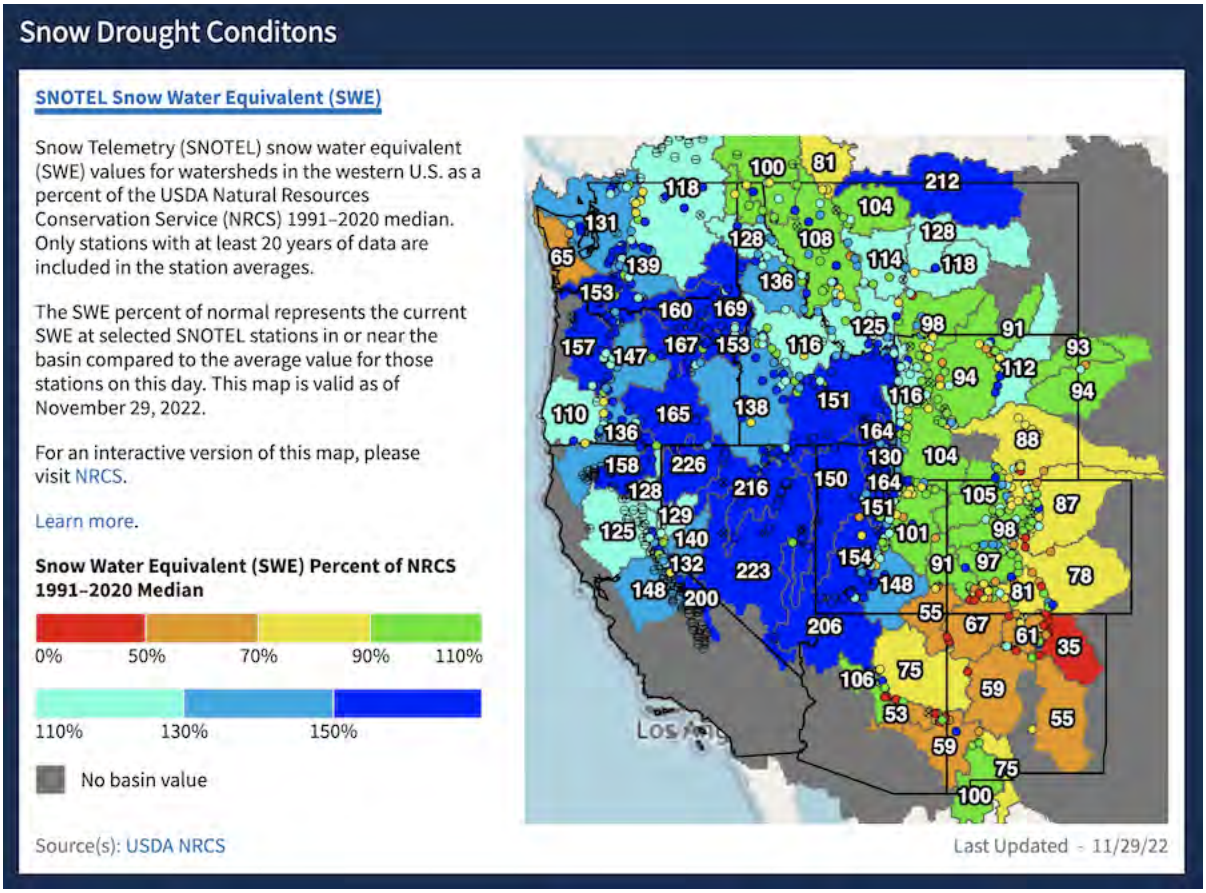


Figure 10: Snow Telemetry (SNOTEL) snow water equivalent (SWE) values for watersheds in the western U.S. as a percent of the USDA Natural Resources Conservation Service (NRCS) 1991–2020 median. Most of the the West has had a strong start in SWE, with only the southeastern parts of the West and a few other spots below median. But it's too early in the snow season to draw conclusions. This map is valid as of November 29, 2022. Source: USDA NRCS (https://www.nrcs.usda.gov/wps/portal/wcc/home/quicklinks/imap#version=167&elements=R&networks=!&states=!&basins=!&hucs=&minElevation=&maxElevation=

Drought.gov Resources

- Snow Drought Data & Maps (https://www.drought.gov/topics/snow-drought)
- What Is Snow Drought? (https://www.drought.gov/what-is-drought/snow-drought)
- Look Back: Water Year 2022 Snow Drought Conditions Summary (/drought-status-updates/water-year-2022-snow-drought-conditions-summary-and-impacts-west)
- Sign Up for the "Dry Times" Newsletter (https://visitor.r20.constantcontact.com/manage/optin?v=001caaqJ6MjGFf-p73chvAwUZ7FJVELPsBFPtaPxgQBRo5TPRMYlTJgDN9ggwe8wDM4iOinVPxeYDxJlciwmvVfCrRCVMFaV3vNqI4iq4mFR_dmzOFndkekzc6NnFjbU4PAbjsUR_GI2z3-rMo%3D)

Helpful Links

- NOAA | El Niño – Southern Oscillation (ENSO) Blog (https://www.climate.gov/news-features/blogs/enso)
- NOAA Climate Prediction Center | ENSO Alert System (https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml)
- NOAA Climate Prediction Center | Seasonal (3-Month) Drought Outlook (/data-maps-tools/us-seasonal-drought-outlook)
- NOAA Climate Prediction Center | Monthly Drought Outlook (/data-maps-tools/us-monthly-drought-outlook)
- USDA Natural Resources Conservation Service | Snow Data (https://www.nrcs.usda.gov/wps/portal/wcc/home/quicklinks/imap#version=167&elements=R&networks=!&states=!&basins=!&hucs=&minElevation=&m
- U.S. Bureau of Reclamation | Major Reclamation Reservoir Conditions (https://experience.arcgis.com/experience/512cef7647fe42698dc05dd4e75d4343/page/Current-Conditions/)
- California Data Exchange Center | Major Water Supply Reservoirs (https://cdec.water.ca.gov/resapp/RescondMain)
- CNAP | California-Nevada Water Storage (https://cnap.ucsd.edu/storage_in_sierra_ucrb/)

Officials fear 'complete doomsday scenario' for drought-stricken Colorado River

By Joshua Partlow

December 1, 2022 at 6:00 a.m. EST

PAGE, Ariz. — The first sign of serious trouble for the drought-stricken American Southwest could be a whirlpool.

It could happen if the surface of Lake Powell, a man-made reservoir along the Colorado River that's already a quarter of its former size, drops another 38 feet down the concrete face of the 710-foot Glen Canyon Dam here. At that point, the surface would be approaching the tops of eight underwater openings that allow river water to pass through the hydroelectric dam.

The normally placid Lake Powell, the nation's second-largest reservoir, could suddenly transform into something resembling a funnel, with water circling the openings, the dam's operators say.

If that happens, the massive turbines that generate electricity for 4.5 million people would have to shut down — after nearly 60 years of use — or risk destruction from air bubbles. The only outlet for Colorado River water from the dam would then be a set of smaller, deeper and rarely used bypass tubes with a far more limited ability to pass water downstream to the Grand Canyon and the cities and farms in Arizona, Nevada and California.

Such an outcome — known as a "minimum power pool" — was once unfathomable here. Now, the federal government projects that day could come as soon as July.

Worse, officials warn, is the remote possibility of an even more catastrophic event. That is if the water level falls all the way to the lowest holes, so only small amounts could pass through the dam. Such a scenario —called "dead pool" — would transform Glen Canyon Dam from something that regulates an artery of national importance into a hulking concrete plug corking the Colorado River.

Anxiety about such outcomes has worsened this year as a long-running drought has intensified in the Southwest. Reservoirs and groundwater supplies across the region have fallen dramatically, and states and cities have faced restrictions on water use amid dwindling supplies. The Colorado River, which serves roughly 1 in 10 Americans, is the region's most important waterway.

The 1,450-mile river starts in the Colorado Rockies and ends in the Sea of Cortez in Mexico. There are more than a dozen dams along the river, creating major reservoirs such as Lake Powell and Lake Mead.

On the way to such dire outcomes at Lake Powell — which federal officials have begun both planning for and working aggressively to avoid — scientists and dam operators say water temperatures in the Grand Canyon would hit a roller coaster, going frigid overnight and then heating up again, throwing the iconic ecosystem into turmoil. Lake Powell's surface has already fallen 170 feet.

Lucrative industries that attract visitors from around the world — the rainbow trout fishery above Lees Ferry, rafting trips through the Grand Canyon — would be threatened. And eventually the only water escaping to the Colorado River basin's southern states and Mexico could be what flows into Lake Powell from the north and sloshes over the lip of the dam's lowest holes.

"A complete doomsday scenario," said Bob Martin, deputy power manager at Glen Canyon Dam, as he peered down at the shimmering blue of Lake Powell from the rim of the dam.

'A catastrophe for the entire system'

In August, the Bureau of Reclamation announced it would support studies to find out if physical modifications could be made to Glen Canyon Dam to allow water to be released below critical elevations, including dead pool. That implies studying such costly and time-consuming construction projects as drilling tunnels through the Navajo sandstone at river level, said Jack Schmidt, a Colorado River expert at Utah State University.

"There was a time in my professional career that if anybody from Reclamation ever said that, they'd be fired on the spot," said Schmidt, who served as the chief of the U.S. Geological Survey's Grand Canyon Monitoring and Research Center during the Obama administration. Even raising that issue is "a huge sea change telling you how different the world is."

This year, the Biden administration called on the seven states of the Colorado River basin to cut water consumption by 2 to 4 million acre-feet — up to a third of the river's annual average flow — to protect power generation and avoid such dire outcomes. But negotiations have not produced an agreement. And the Interior Department has not yet mandated those cuts, even after an August deadline passed for states to propose voluntary reductions.

But these types of ominous scenarios are starting to be considered. With Lake Powell at one-quarter full, Reclamation has begun a feasibility study on the prospect of harnessing the deeper bypass tubes for power generation. The entity that markets Glen Canyon's electricity — the Western Area Power Administration, known as WAPA and part of the Energy Department — is working with two national laboratories to assess what electricity would be available for purchase if Glen Canyon shut down.

And construction is also underway on a project to install deeper pipes to protect the city of Page, Ariz., and its 7,000 residents, from losing its supply of drinking water.

The chances of hitting minimum power pool (lake elevation 3,490 feet above sea level) within the next two years is part of Reclamation's minimum probable forecast, and more likely scenarios have water levels staying above that threshold. But researchers including Schmidt have documented how Reclamation's projections have been too optimistic in recent years amid the warming climate and historic drought that is wringing water out of the West on a grand scale.

"The critical part about what's been happening and what climate change is forcing us to do is: We have to look more at the extremes," said Tom Buschatzke, director of Arizona's Department of Water Resources, said in an interview. "We've got to plan for the low end."

Reclamation said in a statement it now relies on a more recent 30-year climatology window — 1991 to 2020— to make forecasts, which leaves out the wet years of the 1980s and incorporates more drought, which "will improve accuracy and remove some biases."

Buschatzke has also been raising the alarm about Lake Powell reaching dead pool — an elevation 120 feet below the threshold for producing power.

"It is a possibility. I can't tell you the probability," he said. "But that's an outcome that would be not only an ecological disaster, but the world would have its attention on such an outcome in a very negative way."

If that happens, "you're not going to have a river," he added. "It would be a catastrophe for the entire system."

'Huge problems for the Grand Canyon'

In the 23rd year of the Western drought, Lake Powell's once crowded boat ramps end in sand. Dirt bikes roar across newly exposed shores. Exquisite arches and rock formations, lost when the reservoir filled in the 1960s, are re-emerging.

As the water has receded, so has the ability to produce power at Glen Canyon, as less pressure from the lake pushes the turbines. The dam already generates about 40 percent less power than what has been committed to customers, which includes dozens of Native American tribes, nonprofit rural electric cooperatives, military bases, and small cities and towns across several southwestern states. These customers would be responsible for buying power on the open market in the event Glen Canyon could not generate, potentially driving up rates dramatically.

The standard rate paid for Glen Canyon's low-cost power is $30 per megawatt hour. On the open market, these customers last summer faced prices as high as $1,000 per megawatt hour, said Leslie James, executive director of the Colorado River Energy Distributors Association.

"That will be very financially damaging," said Bryan Hill, the utility manager for Page, one of the cities that relies on the dam's low-cost hydropower for one-third to half of its electricity needs. "Huge, for everybody. For businesses. For single moms. It will be a financial hardship."

Glen Canyon's electricity is important for the nation in other ways. The dam is what's known as a "black start" facility for the country's largest nuclear plant, the Palo Verde Generating Station in Arizona. This means the dam could bring the nuclear plant back online if it shut down and needed to restart.

In September, Glen Canyon sent about 80 megawatts of power to California for three hours at the height of its record-breaking heat wave, helping the state narrowly avoid rolling blackouts. It was the second time in the past few years that the dam has been called on to ramp up during emergencies threatening the electric grid, said Adam Arellano, an executive with the Western Area Power Administration.

"Those emergencies would probably happen more frequently without Glen Canyon Dam just because there's such a small margin of available electricity during those really hot days," he said. "That's a very big thing."

When Martin began working at Glen Canyon eight years ago, the drought had already taken a toll on the lake, but he never envisioned a day when the turbines might stop spinning.

"Everybody that works here, your focus, your mission, is to keep these units either running or keep them available to run," he said. "So if you came into a powerhouse and it was quiet, that would kind of go against everything you've dedicated your career to."

Being forced to switch to the four smaller bypass tubes would instantly cut the dam's capacity to release water by two-thirds. If water levels and pressure fell further, these pipes would quickly lose the ability to deliver the millions of acre-feet of water the lower basin states consume each year, the Glen Canyon Institute wrote in a report in August on low water scenarios.

"That dam is just not capable of delivering water at lower levels. It's going to create huge problems for the Grand Canyon," said Eric Balken, the institute's executive director.

Martin and others are now planning ways to stay productive if lake levels reach power pool, even temporarily. They expect a surge in maintenance projects — far easier to complete when turbines aren't spinning — and are lining up materials for the jobs. He compared it to a farmer in winter, whose work doesn't stop.

"What would have been a maintenance nightmare to coordinate, now the equipment is off and you can dive right in there and get all kinds of work done," he said. "So kind of, we're making lemonade with the lemons, I guess."

A disrupted ecosystem

Julie Fleuridas rested on a red rock in Waterholes Canyon, her face flushed in the afternoon sun. For six hours, the 56-year-old Trader Joe's employee and her friends had been paddleboarding down the Colorado River — from Glen Canyon Dam down to Lees Ferry, a 16-mile stretch popular with kayakers, fishermen and flotillas of paddleboarders.

"How far to Lees Ferry from here?" she asked Ted Kennedy, a U.S. Geological Survey research ecologist who was passing by.

"If you stay in the current, it will be less than an hour," he said.

"Last time I did this, like six years ago, it was much quicker," she said. "It's just the water level is so low that the water is just not running fast. So it's a lot of paddling."

There are few people more intimately aware of those flows — and their impact on the web of fish and insect life through the Grand Canyon — than Kennedy. Since 2002, he has worked at the Grand Canyon Monitoring and Research Center in Flagstaff, Ariz., and he has watched this stretch of river throughout this historic drought.

With Lake Powell so diminished, water temperatures have risen dramatically — from the high 40s when he started, to a record high of near 70 degrees this summer — as water closer to the surface is now passing through the dam. Swimming, once for the hardiest, is now commonplace.

The habitat for fish has also transformed. Warming waters have helped recover populations of the humpback chub in the Grand Canyon — a species reclassified from endangered to threatened last year — as it became warm enough to spawn. But the fate of these and other native fish are now confronting fresh threats: the smallmouth bass, a voracious predator.

"This is basically the start of an invasion of a new species," Kennedy said.

Dozens of these bass, including juveniles, have been caught this year in the first 15 miles below Lake Powell— as more of the surface swimmers get sucked through the turbines — prompting an aggressive effort to assess their numbers and block them from the Grand Canyon.

"I believe the smallmouth bass presents a clear and present danger to the humpback chub and other threatened native fish in the Grand Canyon," Ed Keable, superintendent of Grand Canyon National Park, said in an interview. The record-high temperatures "could allow smallmouth bass to reproduce within the entire river system for the first time."

The federal government has begun fighting back on several fronts — from poisoning tributaries to shocking the water with electricity. Some fishing guides worry these methods to eliminate bass will be both futile at stopping the predator and harmful to another important industry: the renowned rainbow trout fishery and the lodges that service it.

Water temperatures have already risen so high — and dissolved oxygen levels fallen so low — as to start harming the trout, according to fishermen and scientists. Dave Foster, a former USGS scientist who has been guiding fishermen for more than three decades, has turned away clients this year after catching weakened trout he can't revive. He worries an expanded electro-fishing effort will be another major blow.

"There will be a negative impact on the trout population," he said. "It's really pretty disconcerting to me."

The trout and the threatened chub could get a reprieve, at least temporarily, if lake levels continue to fall. If the dam drops below power pool, and switches to the deeper bypass tubes, water temperatures in the Grand Canyon would suddenly drop by as much as 15 degrees. This could limit the ability of smallmouth bass to reproduce.

"Going below power pool, initially, could be a good thing if your biggest concern is smallmouth bass," Kennedy said. "But then if you get lower and lower, closer to the dead pool, you get back to that zone where both of those bad things are happening: You're going to have water temperatures in the river that are conducive to their spawning and you're going to be passing large numbers of them through."

'Less like a river, and more like an irrigation ditch'

Arguments against Lake Powell have been around as long as the lake. Its existence, to some, amounts to an ecological atrocity, the drowning of miles of intricate slick rock canyons. Some argue it is unnecessary for water storage, power generation or the tourist economy — despite having more than 3 million visitors last year.

"Everybody keeps running around saying how can we prevent this from happening," said Dan Beard, who served as the Bureau of Reclamation's commissioner from 1993 to 1995. He added that he wouldn't be surprised to see dead pool in the next three years. "My question is: Why should we prevent it from happening?"

But the federal government has already taken unprecedented steps to protect Lake Powell from dropping to dangerous levels.

In May, Reclamation reduced the amount of water it planned to release from the dam from 7.48 million acre-feet to a record low 7 million, the first such midyear cut. It moved another 500,000 acre-feet into Lake Powell from an upstream reservoir. The ongoing negotiations to cut more Colorado River use, if successful, could significantly improve conditions for Lake Powell and Lake Mead, located in Nevada and Arizona.

In late October, the Interior Department signaled it may take further unilateral action by announcing it could revise the guidelines — set in 2007 and revised in 2019 — that regulate water use from Lake Powell and Lake Mead. Interior Secretary Deb Haaland said the administration is "committed to taking prompt and decisive action necessary to protect the Colorado River System and all those who depend on it."

Some say the gravity of the threat is enough to spur the states and federal government to make the necessary cuts in water use.

"I'm actually very optimistic that we're not going to go below power pool," said Arellano, the WAPA executive. "This is the number one issue for pretty much everybody in the hydropower industry."

But the reservoirs remain vulnerable. The most recent five-year hydrology projection estimates the chance at reaching minimum power pool (elev. 3,490) at 10 percent next year and 30 percent in 2024, as dry La Niña conditions are expected to continue. Reclamation predicts there is zero chance of reaching dead pool (elev. 3,370) at Lake Powell over the next five years.

"If there was a line in Vegas, and I was a betting man, I think I'd probably bet we'll go below 3,490," said Charles Yackulic, a research statistician with USGS who is part of a team that was tasked in August to study how power pool or dead pool would impact the Colorado River.

Below that threshold, as Glen Canyon dam is able to release less and less water — the change between how much water is flowing at night or during the day would also diminish. That would lessen the "tides" that now characterize life in the Grand Canyon, water flows that fluctuate based on demand for hydropower.

Ultimately, the Colorado River would "become less like a river," Yackulic said, "and more like an irrigation ditch."

EDITORIAL/TOPICAL > REGULATIONS

EPA Releases Initial Regulatory Flexibility Analysis on Proposed PFAS Rule

Public comment on its proposed reporting rule for PFAS manufacturing in the U.S. indicated a significant economic impact for small businesses.

Dec. 1, 2022

The U.S. Environmental Protection Agency (EPA) released an Initial Regulatory Flexibility Analysis (IRFA) for public comment as part of its development of a rule to gather information about per- and polyfluoroalkyl substances (PFAS).

The IRFA made available Nov. 25 examines the type and number of small entities that may be impacted by the proposed rule, the estimated burden and costs of the proposed rule on small entities, and potential regulatory flexibility alternatives.

EPA proposed the rule under Section 8(a)(7) of the Toxic Substances Control Act (TSCA) in June 2021, as required under the 2020 National Defense Authorization Act. The proposed rule would require all manufacturers (including importers) of PFAS in any year since 2011 to report information to EPA. The covered entities would be required to report on PFAS chemical identity, categories of use, volumes manufactured and processed, byproducts, environmental and health effects, worker exposure and disposal.

When EPA proposed the rule, the agency certified that it would not have a significant economic impact on a substantial number of small entities ("No SISNOSE"), based on information available at the time.

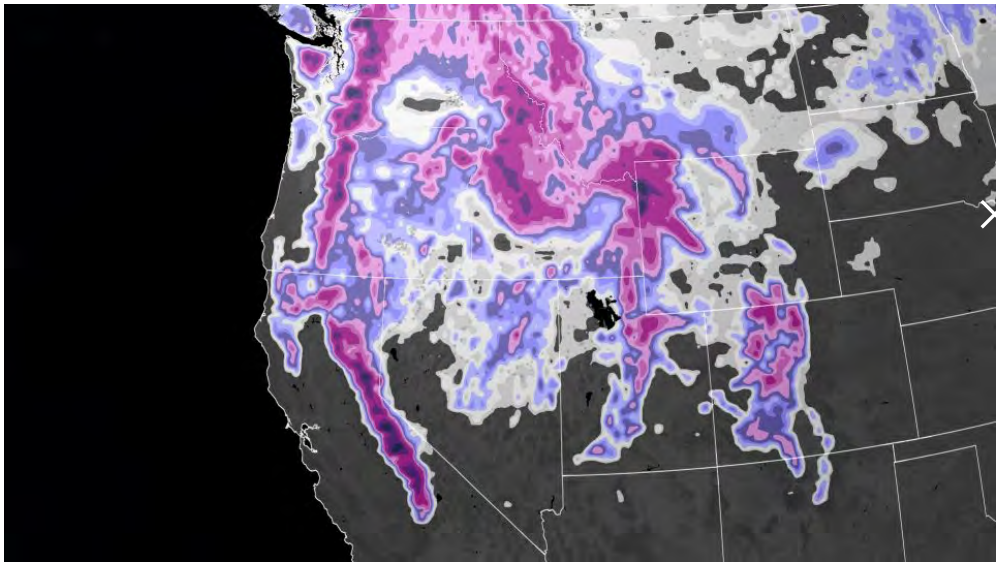
However, since the proposed rule published, EPA has received additional data and feedback through public comments to update its small entity impact analysis, including estimating the number of PFAS article importers.

This updated information does not support a No SISNOSE certification. Given the potential impact on some small entities, EPA convened a Small Business Advocacy Review (SBAR) panel for the proposed rule, which EPA announced in February 2022 and concluded on August 2, 2022. The panel included representatives from the Small Business Administration, the Office of Management and Budget and EPA. Small businesses and trade associations served as Small Entity Representatives (SERs) to provide advice and recommendations.

EPA considered the SBAR panel's feedback in the IRFA released Nov. 25. SERs and panel members helped shape the discussion, including the regulatory flexibility alternatives examined in section 7 of the IRFA. SERs' input also helped describe the universe of small entities and the potential small entity burden and costs (and underlying assumptions to develop those costs) in the IRFA.

EPA welcomes public comment on all aspects of the IRFA, including underlying data and assumptions in developing its estimates, and has noted within the IRFA certain areas on which it is seeking additional comments.

EPA will accept public comments for 30 days following publication in the Federal Register via docket EPA-HQ-OPPT-2020-0549 at www.regulations.gov.



Heavy snow for the West as heavy rain hits the South

Parts of the West have double the normal snowpack. Experts say it's too early to get excited

By Jennifer Gray, CNN Meteorologist

Published 12:29 PM EST, Mon December 5, 2022

A version of this article originally appeared in the weekly weather newsletter, the CNN Weather Brief, which is released every Monday. You can sign up here to receive them every week and during significant storms.

(CNN) — It's beginning to look a lot like Christmas across the West, and for the parched mega drought region the December snow is a welcome gift.

With back-to-back-to-back winter storms across the West, the snowpack is thriving. Parts of the Sierra and the Pacific Northwest are seeing above-average snowpack for this time of year.

In Central California, the Sierra stands at 200% of normal for snowpack average to date.

The drought monitor released some of the numbers Thursday, which showed some of the driest areas in the West with decent snow. Here is where the West stands as of right now for snowpack:

- Great Basin 157%
- Lower Colorado 152%
- California 135%
- Pacific Northwest 134%
- Upper Colorado 98%

“We’re looking fairly good up here at this point,” Andre Schwartz, research scientist at the University of California-Berkeley’s Central Sierra Snow Laboratory said. “We’re definitely above average, as far as how much snow we have on the ground.”

If you are traveling by car, please check the forecast again before hitting the road, so you can find the safest window possible to travel.

“We had this record-breaking number of 18 feet of snow or just under that, and then we had a January through March period, that was the driest on record,” Schwartz explained.

This year, more frequent, smaller storms – in combination with colder temperatures – have allowed the snow to stick better, as opposed to last year, when the snowpack completely melted between snowstorms, exposing dry ground again.

“The snow lover in me is very excited to see the snow come in, and I’m hopeful it means that we’re going to have a good season. The skeptic in me, and the person that worked through last year, is a little bit more hesitant,” Schwartz admitted.

Schwartz explained the key to a successful season is to have consistency.

“We don’t have to have every storm drop feet of snow. They could still be four to six inches at a time. But we just can’t have those super long dry periods where we see midwinter melt that doesn’t normally set us up with a whole lot of success,” Schwartz pointed out.

The Colorado River Basin is another area gaining a lot of attention for water shortages. They are counting on a good snowpack.

Right now, most of the Colorado River Basin is running low. Parts of Arizona are only at 30%of normal.

Other areas, like Southwestern Colorado, are right where they should be this time of year, but it is still incredibly early in the season.

More snow expected this week

Both the Sierra and the Rockies will get hit with more snow this week as multiple storm systems traverse the West.

Snowfall totals for the highest elevations could end up in the one- to two-foot range this week. More widespread snow totals will be less than a foot.

Where to expect snow in the days ahead

Here’s the total snowfall the National Weather Service predicts will fall in the contiguous United States.

After a snowy end to last week and a snowy weekend, another round is affecting the Rockies today through Wednesday.

“Snow totals from this second system are still favoring widespread 6+ inches of accumulation, with the highest terrain seeing upwards of a foot,” the National Weather Service office in Grand Junction said.

The Colorado River Basin and Sierra will need a lot more snow to end with an average season, but the steady stream of snow has been a good sign so far.

The coldest air of the season – by far – will dive down from Canada, bringing dangerously cold temperatures to millions this week. Temperatures will drop so low in some places that frostbite could begin in as little as five minutes on exposed skin.

CNN Meteorologist Haley Brink contributed to this story.

NEWS RELEASE 6-DEC-2022

Estimating forest desiccation to better predict fire danger

Peer-Reviewed Publication
INRAE - NATIONAL RESEARCH INSTITUTE FOR AGRICULTURE, FOOD AND ENVIRONMENT

IMAGE: TREE-TO-ATMOSPHERE WATER FLOW MEASURMENT view more ›
CREDIT: INRAE - BERTRAND NICOLAS

Desiccation of tree foliage is a key factor in the spread of fires. However, during droughts, changes in the water content of forest canopies remain poorly understood. Scientists from INRAE and the CNRS have developed the first model to predict canopy water content during drought and heat waves. Their results, published in the journal *New Phytologist*, could enable the development of fire danger forecasting models that include the role of vegetation in their calculations.

Climate change and increasing drought are making forest fires a growing threat in many parts of the world, including France. Currently, fire departments base their forecasts on climate and weather data without considering the role played by vegetation. For example, the water content of tree foliage is a key factor in the spread of fires, but until now, little research existed on the connection between vegetation response to drought and fire danger. For this reason, plant water function specialists and forest fire specialists teamed up to develop the first model for predicting the water content of plant canopies that includes the response mechanisms of trees to soil and atmospheric droughts.

The researchers based their work on INRAE's SurEau model on plant water function launched in 2017. This model incorporates everything known about plant water function to predict the risk of tree desiccation and mortality. In order to develop and test their hypotheses under real conditions, researchers used data collected

from the Puéchabon experimental forest site (CNRS)*, including tree-to-atmosphere water flow, the level of water stress in the trees and the water content of their leaves.

The SurEau model can now accurately predict water content dynamics in forest canopies during droughts and heat waves. Scientists have thus demonstrated that certain physiological features of trees are key to determining a risk of desiccation. These features include how water is used by trees depending on factors such as leaf surface area or root depth, and the ability of a given species to maintain an internal water circulation circuit, thus reducing susceptibility to cavitation.

Such information, used by the new model to predict desiccation dynamics, is widely accessible in databases targeting the characteristics of different species and vegetation indexes collected remotely. It can be adapted to any type of species and ecosystem.

By establishing a link between forest fire risk, climate and water function in trees, this model predicts an increase in forest vulnerability due to climate change. In the future, the model could help predict fire danger by incorporating the role of vegetation in calculations.

** The Puechabon site is part of a larger ICOS-AnaEE network of other long-term experimental sites that can be used to expand the scope and validity of the model.*

JOURNAL

New Phytologist

DOI

10.1111/nph.18614

ARTICLE TITLE

Plant hydraulic modelling of leaf and canopy fuel moisture content reveals increasing vulnerability of a Mediterranean forest to wildfires under extreme drought

ARTICLE PUBLICATION DATE

11-Nov-2022

City may be ready to boost water recycling

(Bizuayehu Tesfaye/Las Vegas Review-Journal) Evaporation ponds at the Boulder City wastewater treatment facility are shown Nov. 30. Mayor Joe Hardy, who took office Nov. 22, said he wants to end the city's decades-old practice of not recycling water.

By Marvin Clemons Special to the Boulder City Review

December 7, 2022 - 4:14 pm

Even as other communities in the Las Vegas Valley have recycled water since the 1960s, the city closest to Hoover Dam uses up to 500 million gallons a year one time and then casts it away, lost to the air and desert.

But that could change as Boulder City's new mayor favors ending the community's decades-long waste of precious water.

Currently, Boulder City's 16,000 residents use up to 1.5 million gallons of water a day for drinking, bathing, cooking and other needs. The water is then lightly treated, and some is sold for construction and other nonhuman use, but the majority is pumped into nearby evaporation ponds. In 2021, 250 million gallons were lost after one use.

City officials are considering two proposals to make better use of the dwindling resource. The effort comes as officials in the Colorado River Basin seek ways to sharply reduce water use and shore up a shrinking Lake Mead that supplies water to some 40 million people across the Southwest.

One proposal evolved from discussions started years ago between Boulder City and the Southern Nevada Water Authority.

The SNWA would build and pay for a $26 million pipeline from Boulder City's treatment facility to Henderson's treatment plant, where the water would be treated and eventually returned to Lake Mead via the Las Vegas Wash.

"For several years, Boulder City and SNWA informally discussed connecting Boulder City's wastewater system to the existing system in-valley; however, those conversations became more speci c in late 2019," SNWA spokesman Bronson Mack said in an email.

The other proposal would keep wastewater within the city and develop a pipeline system to use it for various irrigation needs, including on golf courses and cemeteries. There currently is no cost estimate for the project.

Both options are considered feasible by SNWA engineers and would be paid for by the water authority.

Mayor Joe Hardy, who took o ce Nov. 22, said the current evaporation pond approach was designed and constructed decades ago when water was abundant.

"Years ago I was not opposed to sending water into the desert to evaporate, but it is a di erent time and we have a di erent need," said Hardy, who served on the City Council in the 1990s and as a state senator and assemblyman.

Hardy said he favors the pipeline to Henderson as it would be the most scally responsible.

"It's a one-time x that the SNWA will pay for and we would not have ongoing expenses," he said.

A pipeline system to irrigate community land could create ongoing staffing and expenses for the city, he added.

Hardy said fully recycling water in a way that helps "the greater good" is important as the 23-year megadrought continues to shrink Lake Mead to about 27 percent of its capacity.

"We are all in the dry sandbox, and we need to make do with less water than we have been accustomed to," he said. "It won't be any skin off our nose to have the water go over the hill (to Henderson) and be used like all other water in the valley."

Support from council members

Councilwoman Sherri Jorgensen also said she leans toward a pipeline to Henderson, but she wants to see costs and timelines for both projects.

"It (better recycling) obviously needs to change as soon as possible," she said. "We should not be pumping our water into the desert."

Cokie Booth, who took her seat on the council Nov. 22, said she also favors the pipeline to Henderson. "It is the easiest and most cost efficient and can be done in three years time. We need to do it the most economical and fastest way," she said.

Fellow new Councilman Steve Walton said he is studying the issue.

"As a citizen of Southern Nevada and City Council representative for Boulder City, I am very motivated to work with the other City Council members and the Southern Nevada Water Authority to determine the best solution for Boulder City's reclamation and re-use of our treated waste water," Walton said in an email. "This is of paramount importance to our community as we seek to be an active, contributing partner in the wise use of our valuable water resources."

Councilman Matt Fox did not respond to requests for comment.

Although she won't have a vote in whatever proposal might come before the council, former Councilwoman Claudia Bridges said she would be elated if better water recycling came to fruition. She is moving to the Pacific Northwest, but she made improved water recycling one of her main goals when she started her term four years ago.

Bridges said concerns of some in Boulder City about growth and losing control of the water "once it goes over the hill to Henderson" have been factors in the council's inaction on the SNWA proposal.

"If I got to rule the world, we would start building the pipeline tomorrow," she said.

While a pipeline system to irrigate golf courses and cemeteries is feasible, Bridges said she sees complications.

"We'd literally have to put in a new water infrastructure," she said. " You would have a third type of water underground, raw water (lines), potable water (lines) and irrigation (lines)."

SNWA waiting for Boulder City

On Aug. 9, the council received a presentation covering both proposals, with an SNWA administrator telling the council that the water authority would fully support either option and would pay for whichever one is approved.

Mack said the next step is up to Boulder City.

"The Southern Nevada Water Authority is coordinating with the city of Boulder City to explore options that will allow for the reuse of Boulder City's treated wastewater, including recycling and reusing that treated wastewater for outdoor irrigation purposes or connecting the wastewater with the infrastructure currently in-valley, which would then allow all of that treated waste water to be returned to Lake Mead, extending our water supply," Mack said in an emailed statement.

Other Las Vegas Valley cities have been returning treated wastewater back to Lake Mead via the Las Vegas Wash since the 1950s and '60s, Mack said.

"For every gallon returned to Lake Mead, Southern Nevada can take another gallon out through the drinking water treatment process, and it does not count against our 300,000 acre-foot water allocation."

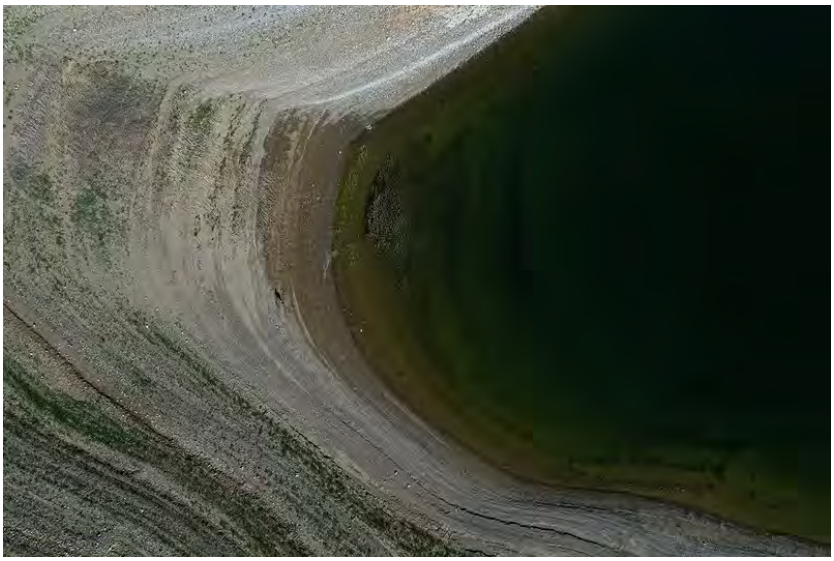
Contact Marvin Clemons at mclemons@reviewjournal.com. Follow @Marv_in_Vegas on Twitter.

Everything you need to know about the US megadrought

From individual water use to lessons from past civilisations, here's what our *Parched Earth* series revealed about the impact of the megadrought in south-western North America

ENVIRONMENT 7 December 2022

By **Tiffany O'Callaghan**



A dried lake bed at the San Luis Reservoir in California
David Paul Morris/Bloomberg via Getty Images

Since 2000, south-western North America has been in the grips of a megadrought. The severe dry spell is dramatically changing the landscape, drying up lakes and threatening water supplies.

Extreme droughts of this kind are not new — they have occurred on every continent outside Antarctica for the past 2000 years. But only recently have we started to pin down the complex global climate patterns that cause them.

In our Parched Earth series, we have taken a hard look at this unique moment for North America. We have examined what causes megadroughts, when the current one will end and what permanent scars the land will bear thereafter.

We have also considered how personal and political decisions can help or make matters worse – from reckoning with the expansion of water-intensive data centres to guring out what gets people to use less water.

Finally, in a cover story for the US edition of our magazine, we examined the particular threat to the Colorado river and the radical proposals to save it that are nally being taken seriously. It is increasingly clear that the awe-inspiring landscapes of south-western North America will be forever altered by this extreme drought, but we still have some say in what that new future will come to look like.

What is a megadrought?

What is megadrought? How scientists define extreme water shortages

The dry spell in south-western North America is so severe that researchers don't just call it a drought but use the term "megadrought" instead. The growing consensus is that such droughts will become both more common and more severe thanks in part to human-driven climate change.

When will the megadrought end?

Megadrought could become the new normal in the south-western US

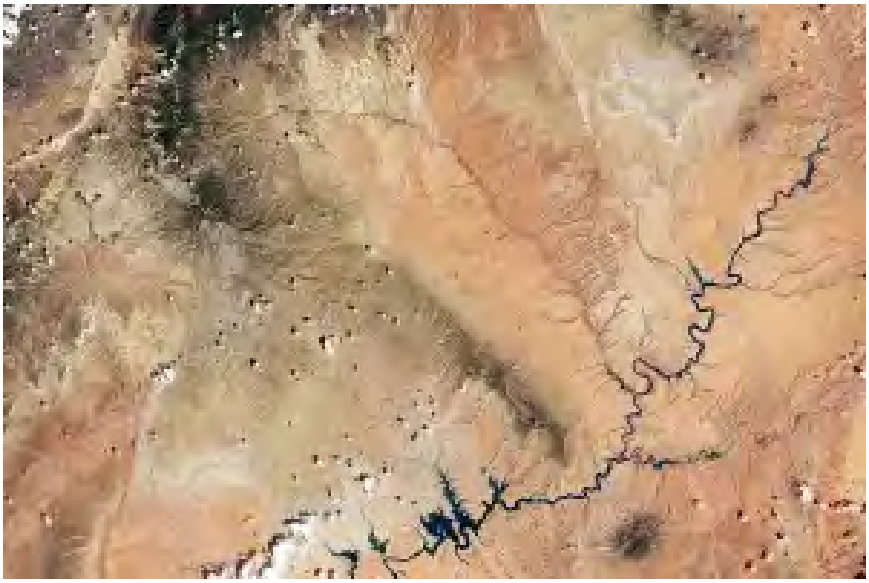
In a new analysis in October, drought researchers from NASA and New York University found that the dry conditions in south-western North America may not simply pass – but that instead we may be facing a permanent climate shift known as "aridification".

Do data centres contribute to drought?

How much water do data centres use? Most tech companies won't say

Our ever-growing appetite for data may exacerbate droughts, as data centres use a tremendous amount of water for cooling. And, this may become more pronounced in the years ahead – many data centres are under construction in some of the most drought-stricken areas of the US.

How is the megadrought changing the land?



Shocking images show scale of megadrought devastation in North America

The changes underway on our planet are severe, and they become all the more striking when we zoom out to get a glimpse from space. From that vantage, the effect on the landscape is truly breathtaking.

Is climate change making the megadrought worse?

What is causing the megadroughts in North and South America?

Megadroughts have recurred throughout history, but anthropogenic climate change can deepen existing climate trends. As we come to grips with exactly how this happens, an even bigger question looms: is climate change not just amplifying the effects of long-established patterns, but disrupting them as well?

Will the land go back to how it was before the megadrought?

The US megadrought won't just end – it will change the land forever

The aftermath of extreme historic droughts may give us some insight into what the future holds – and

it is a sobering view. Even if the rains return, the land will may be forever altered. As climate scientist Samantha Stephens told New Scientist, “By today’s standards, we’ll be in a drought all the time.”

What makes people curb their water use – and does it really make a difference?

When water runs short, how do you get people to use their fair share?

Coping with a dramatically reduced water supply requires significant cutbacks in water use – from power generation and agriculture to individuals in their homes. One of the most effective ways to do this involves showing people how their water use stacks up with that of their neighbours.

How can I cut back on my water consumption right now?

8 things you can do right now to cut back your water use

Fortunately, there are many small changes that have an outsized effect on reducing water use. Running the dishwasher is far more water-efficient than handwashing dishes, for instance, and simply turning off the tap while you brush your teeth could save up to 15 litres of water per brushing.

How might the megadrought change society?

US megadrought could upend life as we know it – just look to history

There are many examples from history that suggest social and political upheavals are common in the wake of severe dry spells. In this interactive graphic, we explored the relationship between extreme drought and the collapse of civilisations across the world.

How do we save the Colorado river?

Why the Colorado river is drying up – and what we can do about it

The majestic Colorado river that carved the Grand Canyon is at unprecedentedly low levels. Though water use policies that date back a century set the current crisis in motion, the ongoing drought conditions have made matters significantly worse, and are now prompting radical proposals to save the Colorado.

Wednesday, December 21, 2022

GOVERNMENT

Sheriff requests ordinance to ban camping in public areas

By Kristen Hackbarth | **Published:** December 8, 2022 | **Last Updated on** December 9, 2022

Washoe County's Board of County Commissioners next week will consider whether to initiate county code amendments to ban non-recreational camping in public areas.

The request comes via the Washoe County Sheriff's Office "to update governance around unauthorized camping and/or storage of personal property which may pose a risk of significant harm to any person or public area."

A county staff report notes that the county's strategic objective affected by the agenda item is "vulnerable populations," indicating an effort to prevent camping by people living otherwise homeless.

The proposed ordinance changes would ban sleeping or setting up bedding, storing personal belongings, making a fire or cooking, sleeping in cars or other vehicles, using tents or shelters or doing any digging or "earth breaking" with the intent to create living accommodations.

If approved as proposed, people who violate the law would be guilty of a misdemeanor with up to six months in jail, up to a $500 fine or both.

ACLU Nevada, in a 2020 presentation on homelessness to the Reno Human Rights Commission, called ordinances prohibiting camping as criminalizing homelessness and "appear generally applicable [to all citizens in] a municipality, but in practice are enforced as part of a custom and practice of driving homeless people from public spaces."

West Juhl, the communications and campaigns director for ACLU Nevada said criminalizing and imposing burdensome fines on people struggling with poverty is never the answer.

"We'll be interested to analyze an actual ordinance, but we're always suspicious, in a constitutional sense, of camping bans and laws designed to specifically target unsheltered and houseless people," they said. "These Nevadans need actual help such as permanent supportive housing, not $500 fines and jail sentences."

The City of Reno has several ordinances that ACLU officials say criminalize homelessness, including bans on camping, sitting or lying in doorways or sidewalks, camping on public property in the Truckee River corridor and being in parks after hours.

Both Washoe County and the cities of Reno and Sparks over the past several years have worked to reduce the number of people camping in the community.

Last November the WCSO applauded the cleanup of several tunnels under Veterans Parkway where people had been living and storing their belongings. They noted that those living in the tunnels had received housing assistance from the MOST team.

The county now operates Nevada Cares Campus, the 764-bed shelter near downtown Reno. As of Dec. 7, only 12 beds were available – six in the emergency shelter and six in the safe camp. Another six beds for women were available at the Our Place shelter for women and children.

The Board of County Commissioners meets Tuesday, Dec. 13 at 10 a.m. in commission chambers at 1001 E. Ninth Street.

Kristen Hackbarth Editor

Kristen Hackbarth is a freelance editor and communications professional with more than 20 years' experience working in marketing, public relations and communications in northern Nevada. Kristen graduated from the University of Nevada, Reno with a degree in photography and minor in journalism and has a Master of Science in Management and Leadership. She also serves as director of communications for Nevada Cancer Coalition, a statewide nonprofit. Though she now lives in Atlanta, she is a Nevadan for life and uses her three-hour time advantage to get a jump on the morning's news.

December 9, 2022

EPA to Reconsider Stronger Rules for Lead in Drinking Water

Agency asks court to allow revisions and new rulemaking for the Lead and Copper Rule

CONTACTS

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WASHINGTON, D.C. — Today, the U.S. Environmental Protection Agency (EPA) filed a court motion saying it will reassess revisions it made to the Lead and Copper Rule during the Trump administration, promising key improvements to the rule. The Lead and Copper rule, or LCR, regulates lead in drinking water. The EPA is asking for the remand in response to a challenge brought by Earthjustice, on behalf of civil rights and environmental groups. With this action, EPA is looking to move the issue out of the courts.

According to their filing, EPA plans several changes to improve the rule, most importantly, mandating lead service line replacement for all such lines across the country. EPA also plans to consider prioritizing overburdened communities, requiring action from water utilities at lower lead levels than currently required, and it will reconsider provisions that slowed lead service line replacement and allowed some utilities to avoid lead service line replacement altogether. EPA says it will propose a new rule in September 2023.

“For decades the outdated LCR failed to protect families from lead in their drinking water. And the Trump administration’s updates to the rule were not enough to protect communities from lead contaminated water, and indeed, took some steps backwards,” said **Suzanne Novak, senior attorney at Earthjustice**. "EPA’s commitment to strengthening the LCR is welcome news. Communities bearing the brunt of lead contamination are owed a new rule that is health protective, requires replacement of all lead service lines, and does not settle for modest tweaks. We look forward to the Biden administration issuing a stronger rule.”

Even in small amounts, lead can cause irreversible brain damage in children, miscarriage, stillbirth, and cardiovascular disease. There are still as many as 10 million lead service lines in the country, and researchers estimate that these lead pipes deliver water to as many as 22 million people.

Communities of color and low-income families face disproportionate exposure to lead in water because they are more likely to live in older homes with lead service lines. Conservative estimates indicate that half a million children under the age of six have elevated lead levels in their blood. Further, a study by the Centers for Disease Control and Prevention found that 11.2% of Black children and 4% of Mexican-American children are poisoned by lead. There is no safe level of lead exposure, according to the Centers for Disease Control and Prevention.

In 2020, EPA released its updated — but flawed — LCR rule. It took no steps towards eliminating all lead service lines — indeed it dramatically slowed down the rate at which lead pipes were required to be replaced. It also allowed small public water systems that used to be required to replace lead service lines, to avoid replacing them altogether, even if those systems continually exceed the so-called lead action level. Earthjustice sued soon after. There were additional lawsuits filed by the Natural Resources Defense Council, and 10 attorneys general from nine states, and the District of Columbia.

QUOTES FROM OUR CLIENTS:

"Now is the time for the EPA to break the cycle of lead contamination once and for all. Too many generations of children in our communities have been poisoned by lead," said **Queen Zakia Shabazz, founder and executive director of United Parents Against Lead & Other Environmental Hazards (UPAL)** a nonprofit based in Richmond, Virginia. "There is no safe level of exposure to lead and our families must be afforded the protections we have long deserved. UPAL looks forward to working with the agency to make sure every child is protected."

"Newburgh Clean Water Project applauds the EPA for working to bring inclusive, 21st century solutions to a very old problem — contamination of water from lead," said **Deborah Brown, Newburgh Clean Water Project Steering Committee member**.
"We are encouraged to learn that the EPA is listening to community concerns over exposure to a long-known contaminant and will hopefully act to solve this problem once and for all, and protect all who drink water in the U.S., no matter what zip code they live in, no matter their income level or political influence level, by making sure their water is lead-free."

"The NAACP believes that every person in this country is entitled to clean, quality, drinking water," said **General Counsel for the NAACP, Janette McCarthy Wallace**. "We are pleased that the EPA is requesting remand of all issues raised in this suit. This signifies the agency's recognition that the petitioners raised legitimate concerns about the revisions to the Lead and Copper Rule put in place by the last presidential administration."

"We are encouraged to see the EPA taking action today. Lead in water is still a major problem for families and their children all over the country and we are looking forward to more protective lead policies informed by science," said **Sonya Lunder, senior toxics policy advisor at the Sierra Club**. "If this EPA is serious about stopping children from drinking lead-tainted water, mandating complete replacement of lead service lines in a promising start."

"This is welcome news: EPA's commendable decision to no longer defend its weak lead in tap water rule is what health experts and affected communities across the country have been urging the agency to do. The health of millions of people, especially our kids, is threatened by lead whenever they turn on their taps. Safe drinking water is a basic human right, so EPA must quickly tackle the lead contamination crisis by setting a much stronger lead rule and ensuring that all lead water pipes are pulled out of the ground in the next decade," said **Erik D. Olson, senior strategic director for Health at NRDC**.

D.C. Download: House OKs military pay raise, Tahoe clarity funding

Gabby Birenbaum December 10th, 2022 at 2:00 AM Congress

Lake Tahoe. Photo by David Calvert. Aug. 16, 2022.

Good morning, and welcome to the Indy D.C. Download newsletter, a weekly look at what's going on in the nation's capital as it relates to Nevada. I'm Gabby Birenbaum, the Indy's new D.C. Correspondent and D.C. Download author. I'm going to be covering Nevada's congressional delegation, so if there are any suggestions you have for how to improve the newsletter, segments you'd like to see, or policies you're interested in learning more about, send me an email!

If a colleague or associate emailed this newsletter to you, please click here to sign up and receive your own copy of Indy D.C. Download in your inbox.

Defense authorizations, omnibus negotiations, and immigration deals, oh my!

This week was a busy one in Congress, as the House passed a critical defense bill on a bipartisan basis, Sen. Raphael Warnock's (D-GA) win secured a wider Democratic majority in the Senate, and Nevada's congressional delegation tackled droughts and antisemitism.

How the NDAA will a ect Nevada's servicemembers, water resources

On Thursday, the House passed the 2023 National Defense Authorization Act, an annual – and typically bipartisan – bill that sets spending levels and policy for defense agencies. The biggest Nevada provision in the more than 4,000-page bill is the expansion of Fallon Naval Air Station in Churchill County (see my story on Monday for details!), but the NDAA also contains several provisions that authorize new spending in Nevada, both for military and water resource purposes, and a ect Nevada's signi cant active military and veteran populations.

The NDAA passed the House 350-80, with the support of all four of Nevada's House representatives. In a notable concession to Republicans and in rebuke of the White House's stated preference, the bill directs all military agencies to end vaccine requirements. But the Biden administration did secure several of its foreign policy objectives, including $800 million in the next scal year for Ukraine.

Upon Senate passage and Biden's signature, military servicemembers and the Department of Defense civilian workforce will see a 4.6 percent pay raise. The military's basic needs allowance has been raised from a minimum of 130 percent of the poverty level to 150 percent. A new pilot program will reimburse for child care costs incurred because of a change of station. And the NDAA will overhaul how sexual assault cases are handled in the military, appointing independently trained prosecutors to work with people reporting misconduct rather than their own commanders and creating a new once to process the complaints.

The NDAA also authorizes several notable upgrades to Nevada military facilities – projects pushed by Sen. Jacky Rosen (D-NV) from her position on the Senate Armed Services Committee. The Department of Defense will provide $18 million in new funding for the Army National Guard Harry Reid Training Center in Reno, $30 million for a new F-35C Maintenance Hangar at Fallon, and $7.2 million to upgrade the dormitories at Nellis Air Force Base in Clark County.

Rep. Dina Titus (D-NV) also won a few legislative victories in the NDAA, with the inclusion of several of her transportation and infrastructure priorities as part of the Water Resources Development Act, which was packaged with the NDAA.

"I am proud to have led the effort to fund programs that will address problems facing the West, including clarity in Lake Tahoe, flood control, and drought resistance," Titus said in a statement.

The Lake Tahoe 108 Program, an Army Corps of Engineers (USACE) initiative to restore the Tahoe basin's environmental infrastructure, will double its budget, receiving an additional $25 million to continue its restoration work. And the Rural Western Water Program, which funds water and wastewater projects in rural Clark County to better store, protect, and treat water, will receive a $365 million funding increase.

The water bill also included the extension of a pilot program to target invasive species in alpine lakes and allows the Corps of Engineers to contract with institutions of higher education for flood control management.

The bill's House passage was secured in large part due to what provisions did not make the NDAA. Despite last-ditch e orts from Sen. Joe Manchin (D-WV), permitting reform, which would have eased the requirements to obtain a permit for energy projects, was left out, to the relief of conservation groups in Nevada.

Patrick Donnelly, the Center for Biological Diversity's Great Basin Director, said Manchin's permitting reform legislation would have heavily a ected Nevada, as a state where most of the land is federally owned.

"Almost everything is guided by those very laws that Manchin was looking to amend," Donnelly said. "In some ways, permitting reform could have been as or more consequential in Nevada than any other state in the union."

During negotiations, there were discussions of adding the SAFE Banking Act, which would allow banks to lend to cannabis companies and would have a profound effect on Nevada's cannabis industry. But the provision never made it in the final text.

And while Fallon expansion will be the biggest change for the Department of Defense's presence in Nevada, Rep. Mark Amodei (R-NV) said he is pleased with how the rest of the bill turned out as well.

"We're happy that Fallon's in there," he said. "But on balance, if Fallon had nothing to do with it, I think there's still a lot of good stuff in there."

Rosen leads senators calling for whole-of-government approach on antisemitism

Sen. Jacky Rosen (D-NV), the former president of Congregation Ner Tamid in Henderson, led 122 members of Congress in sending a letter to President Joe Biden calling for a whole-of-government approach to combat rising antisemitism.

The letter comes after former President Donald Trump dined with Nick Fuentes, a white supremacist and Holocaust denier, and rapper Ye, who has made several antisemitic statements in recent weeks, including a threat on Twitter to go "def con 3 on Jewish people" and expressing admiration for Adolf Hitler.

In an interview, Rosen said she has been hearing concerns "not just in my own home temple community in Henderson, and not only with Jews across the country, but with everyone who just worries about antisemitism and the rising hatred in this country.

"We know that antisemitism is usually that first line," she continued. "It's not the last, but it's usually the first."

In the letter, lawmakers noted that both the FBI and several nonpro t groups found that antisemitic hate crimes have risen signi cantly in the last three years and called out several notable terrorist attacks against Jewish people. They called for greater inter-agency coordination between institutions that track and combat antisemitism, including the FBI, the Department of Education, and the United States Holocaust Memorial Museum.

"Because many individual agencies play a critical role in combating antisemitism, closer coordination is needed to share best practices, data, and intelligence; identify gaps in efforts; streamline overlapping activities and roles; and execute a unified national strategy," the letter said. "The strategic collaboration of such entities would also send a key message to the American people and the international community that the United States is committed to fighting antisemitism at the highest levels."

The lawmakers are part of the House and Senate Bipartisan Task Forces for Combatting Anti-Semitism. Rosen founded the Senate version in 2019 with Sen. James Lankford (R-OK).

In addition to the letter, Rosen, along with Jewish colleagues Sens. Ben Cardin (D-MD) and Richard Blumenthal (D-CT), met with officials in the Biden administration earlier this month to discuss the issue.

Western senators ask Department of Agriculture to address Western water shortages

Cortez Masto and Rosen joined 13 other Western senators, across both parties, to send a letter to Agriculture Secretary Tom Vilsack calling on his department to improve its practices in combating Western droughts.

The Department of Agriculture (USDA) manages several water-related programs across the country, including agriculture conservation programs. But the senators said USDA was not adequately utilizing its existing resources and funding to tackle drought issues in the West and lacked institutional knowledge about Western water practices.

Western states are in the midst of a megadrought – a recent **UCLA study** found that current conditions amount to the deepest drought in 1,200 years. Western senators made the case that these conditions affect the food supply in their states and beyond.

"The acute shortage of water for Western growers threatens productive farmland across our states, which are both a pillar of our rural economies and drivers of America's food production," the senators wrote.

But USDA resource allocation has been unbalanced, the senators alleged, in part because of understaffing in Western offices and a knowledge gap regarding Western agricultural techniques. The resources to prioritize the water conservation programs that work in the West are already funded, especially through new streams such as the Inflation Reduction Act and the Infrastructure Investment and Jobs Act. But doing so, the senators write, requires giving the West an equal footing.

"We urge the U.S. Department of Agriculture (USDA) to give parity to the needs of our States as Western growers and communities face these dire conditions," the senators wrote.

They speci cally pointed to the National Resource Conservation Service and the Farm Service Agency as departmental programs that su er from a lack of engineers and experts well-versed in Western water conservation.

In addition to Nevada's senators, the letter's signatories included both senators from Arizona, California, Colorado, Oregon, New Mexico, and Utah, as well as Washington's Sen. Patty Murray (D).

Rosen's maternal mortality data mapping bill passes House

Rosen won a legislative victory this week when an amended version of her bill, The Data Mapping to Save Moms' Lives Act, passed the House in a 380-46 vote.

The bill, which will now go back to the Senate for passage again, instructs the Federal Communications Commission to include data on maternal morbidity and mortality in its Mapping Broadband Health in America platform, which displays both broadband and health data for users to understand how they interact.

Rosen, a former computer programmer, said the idea behind the bill is to get more data on where rates of illness and death after having a baby are highest, in order to increase telehealth and mobile health care options in places where rates are high and broadband access is low.

"This is going to take the information that the FCC provides us where high maternal mortality rates overlap with the lack of access to broadband services," Rosen said in an interview. "This is going to help us pinpoint where we have to put telehealth resources [and] educational resources – because one mother's life lost is one mother too many."

Around the Capitol

- With his runoff victory in Georgia, **Sen. Raphael Warnock (D-GA)** delivered Democrats a crucial **51st seat** in the Senate, making the balance of power 51-49 in their favor. With a true majority, Democrats can now maintain majorities on Senate committees, making it easier for them to issue subpoenas, pass legislation out of committees, and handle absences – although **Sen. Kyrsten Sinema**, formerly a Democrat, potentially complicated things by declaring herself an independent.
- Sens. Thom Tillis (R-NC) and Sinema have floated an **immigration deal** that would create a path to citizenship for Dreamers in exchange for another year of Title 42, which allows the U.S. to turn away asylum seekers and migrants at the border under public health authority. Previous bipartisan immigration deals have never found 60 votes – and there are only 24 days until Republicans take over the House and likely kill the chances of meaningful immigration reform. Read my co-authored story with Jannelle Calderon for more.
- New Democratic Leader-elect Hakeem Jeffries named Rep. Steven Horsford (D-NV) to his Policy & Steering Committee, which doles out committee assignments and advises leadership on policy.
- The House passed the Respect for Marriage Act, which federally protects same-sex marriage, 258-169. Nevada's three House Democrats voted yes, while Rep. Mark Amodei voted no. In an interview, Amodei said the bill was unnecessary because Nevada had already safeguarded the right to same-sex marriage, and that, through the full faith and credit clause, the Constitution already safeguards the right for a marriage in Nevada to be respected in other states.

AP

Truckee Meadows Water Authority Stabilizes Rates for Customers by Driving Operational Efficiencies with InvoiceCloud

Business Wire
Dec 14, 2022

RENO, Nev. & BOSTON--(BUSINESS WIRE)--Dec 14, 2022--

Truckee Meadows Water Authority (TMWA), a not-for-profit, community-owned water utility, announced the results of implementing InvoiceCloud, an EngageSmart (NYSE: ESMT) solution for online bill payment services. TMWA achieved $175,000 in annual operational efficiencies by driving e-adoption, enabling the utility to offset rising costs and stabilize rates for customers.

This press release features multimedia. View the full release here: https://www.businesswire.com/news/home/20221214005210/en/

TMWA has approximately 250 employees and serves over 135,000 customer accounts spanning a service area of 170 square miles. Prior to implementing InvoiceCloud's digital engagement and payment solution, TMWA was using multiple payment vendors and systems that did not communicate with each other. Customers were frustrated with the lack of payment options and difficult user experience. To remove friction in the payment process and streamline all payment channels under one solution, TMWA adopted InvoiceCloud's true SaaS billing, payment, and customer engagement solution.

Working together with its customers, TMWA drove digital self-service through a 22% increase in AutoPay adoption and a 20% decrease in mailed in payments in its first year with InvoiceCloud, as well as a 3x increase in paperless enrollment in the past year
(measured Oct. 2021 through Oct. 2022). With the significant decrease in operational expenses, optimization of staff workload, and increase in overall savings, TMWA was able to apply the resources saved towards stabilizing rates for customers, even amid an industry-wide rise in rates. InvoiceCloud's digitized billing and payments process saves employees and customers time and money by helping to reduce paper costs and late payments. With increased self-service options, customers are able to make payments and self-manage their utility account in the ways most convenient to them. This, in turn, frees-up 25 hours of TMWA staff time per month that can now be used on high-impact community projects.

With InvoiceCloud, TMWA customers have expanded access to a variety of payment methods including online billing, AutoPay, pay by mail, pay by phone, and more.

"The user experience with InvoiceCloud is night and day compared to our previous systems, and our staff has gained valuable time back in the day to focus on other operational tasks," said Marci Westlake, Customer Service Manager at Truckee Meadows Water Authority. "Keeping customers happy is TMWA's number one priority, and InvoiceCloud helps make that happen."

For more information on Truckee Meadows Water Authority's experience with InvoiceCloud, check out their story here.

About Truckee Meadows Water Authority:

Truckee Meadows Water Authority is a not-for-profit, community-owned water utility, overseen by elected officials and citizen appointees from Reno, Sparks, and Washoe County. TMWA has 258 employees serving over 135,000 customer accounts spanning a service area of 170 square miles.

About InvoiceCloud:

InvoiceCloud, an EngageSmart solution, is a leading provider of online bill payment services. Founded in 2009, the company has grown to be one of the leading disruptors in the cloud-based electronic bill presentment and payment (EBPP) space, helping institutions put customer experience first. By switching to InvoiceCloud, clients can improve customer engagement, loyalty, and efficiency while reducing churn and missed payments in the process. To learn more, visit www.InvoiceCloud.com.

About EngageSmart:

EngageSmart is a leading provider of vertically tailored customer engagement software and integrated payments solutions. At EngageSmart, our mission is to simplify customer and client engagement to allow our customers to focus resources on initiatives that improve their businesses and better serve their communities. EngageSmart offers single instance, multi-tenant, true Software-as-a-Service ("SaaS") vertical solutions, including SimplePractice, InvoiceCloud, HealthPay24 and DonorDrive, that are designed to simplify our customers' engagement with their clients by driving digital adoption and self-service. As of September 30, 2022, EngageSmart serves 94,500 customers in the SMB Solutions segment and 3,300 customers in the Enterprise Solutions segment across several core verticals: Health & Wellness, Government, Utilities, Financial Services, Healthcare and Giving. For more information, visit www.engagesmart.com and follow us on LinkedIn.

Forward-Looking Statements

Certain statements in this release are "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995 and are based on current expectations and assumptions that are subject to risks and uncertainties. All statements contained in this news release that do not relate to matters of historical fact should be considered forward-looking statements, and are generally identified by words such as "expect " "intend " "anticipate " "estimate " "believe " "future " "could " "should " "plan "

"aim," and other similar expressions. These forward-looking statements include, but are not limited to, statements regarding anticipated financial performance and financial position, including our financial outlook for the full year 2022 and thereafter, and other statements that are not historical facts. These forward-looking statements are neither promises nor guarantees, but involve risks and uncertainties that may cause actual results to differ materially from those contained in the forward-looking statements. Our actual results could differ materially from those anticipated in these forward-looking statements for many reasons, including, but not limited to, the following: our inability to sustain our rapid growth; failure to manage our infrastructure to support our future growth; our risk management efforts not being effective to prevent fraudulent activities; inability to attract new customers or convert trial customers into paying customers; inability to introduce new features or services successfully or to enhance our solutions; declines in customer renewals or failure to convince customers to broaden their use of solutions; inability to achieve or sustain profitability; failure to adapt and respond effectively to rapidly changing technology, evolving industry standards and regulations and changing business needs, requirements or preferences; real or perceived errors, failures or bugs in our solutions; intense competition; lack of success in establishing, growing or maintaining strategic partnerships; fluctuations in quarterly operating results; future acquisitions and investments diverting management's attention and difficulties associated with integrating such acquired businesses; general economic conditions (including inflation and rising interest rates), both domestically and internationally, as well as economic conditions affecting industries in which our customers operate; the war in Ukraine; concentration of revenue in our InvoiceCloud and SimplePractice solutions; COVID-19 pandemic and its impact on our employees, customers, partners, clients and other key stakeholders; legal and regulatory risks; and technology and intellectual property-related risks, among others.

Other important risk factors that could affect the outcome of the events set forth in these statements and that could affect the Company's operating results and financial condition are discussed in Item 1A of our Annual Report on Form 10-K for the year ended December 31, 2021, and our subsequent Quarterly Reports on Form 10-Q, as updated by our future filings with the Securities and Exchange Commission ("SEC").

Such statements are based on the Company's beliefs and assumptions and on information currently available to the Company. The Company disclaims any obligation to publicly update or revise any such forward-looking statements as a result of developments occurring after the date of this document except as required by law.

Disclosure

We disclose information to the public concerning EngageSmart, EngageSmart's products and services, and other items through a variety of disclosure channels in order to achieve broad, non-exclusionary distribution of information to the public. Some of the information distributed through these disclosure channels may be considered material information. Investors and others are encouraged to review the information we make public in the locations below.* This list may be updated from time to time.

*For information concerning EngageSmart and its products and services, please visit: engagesmart.com

*For information provided to the investment community, including news releases, events and presentations, and SEC filings, please visit:
investors.engagesmart.com/overview/default.aspx

*For information provided to the media, including news releases, please visit: investors.engagesmart.com/news/default.aspx

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INDUSTRY KEYWORD: DATA MANAGEMENT OTHER ENERGY TECHNOLOGY UTILITIES ENERGY SOFTWARE

SOURCE: EngageSmart

PUB: 12/14/2022 09:00 AM/DISC: 12/14/2022 09:02 AM

http://www.businesswire.com/news/home/20221214005210/en

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Wednesday, December 21, 2022

GOVERNMENT

Assessor devalues Lemmon Valley properties due to Swan Lake stench

By Bob Conrad | December 15, 2022

Washoe County Assessor Mike Clark this week issued a statement through a private public relations company saying his office has devalued more than 3,000 properties in Lemmon Valley after residents complained about the stench coming from Swan Lake.

"When I heard their stories, it was disturbing," Clark said of the residents living in the area.

The lake flooded in 2017 causing homes to be destroyed and inhabitable. Earlier this year the lake receded and "naturally occurring" processes are causing the odors, according to county officials, as water had evaporated.

Clark, however, said the sewage discharge into Swan Lake is at least part of the cause for the smell.

"The many folks that lived there for a number of years, they've never experienced this before. Everyone seemed to blame the water treatment plants," Clark said. "They felt that the sewer treatment plant was part of the problem. They didn't feel it was just rotting vegetation."

The property devaluations of 10% can be removed if the lake's condition improves.

Clark said the same criteria for the property valuations used in Lemmon Valley also applies to noise and properties near the airport, or other areas that may be impacted by noxious odors

"We had a realtor who lived in that area to stand up and say she refuses to sell property or even show property in that area, because she's afraid if the smell comes back or [is] stronger people might blame the realtor for not disclosing that," Clark added.

He said the property devaluations actually could have been greater than the 10%.

Clark comes in swinging as new commissioner

Clark is also the newly elected county commissioner
who will soon be sworn in to start his term in 2023. He's already hurling allegations against the county, of which he has alleged corruption and mismanagement to the point that it got him restricted from visiting his own office as assessor.

A judge last year found Clark's mailing of anonymously authored documents alleging corruption and mismanagement to be "altogether creepy and disturbing" and granted a year-long temporary protective order against Clark.

The Washoe County Sheriff's Office, along with the U.S. postal inspector, investigated the matter and found, to the dismay of the county manager and others in his office, that it was Clark, caught on security cameras, mailing the packets.

The judge, after county officials investigated the mailings, determined Clark violated the county's harassment policies.

Clark, in turn, sued Assistant County Manager Kate Thomas for alleged defamation. He lost that case after Thomas' attorney filed an anti-SLAPP (strategic lawsuit against public participation) motion.

Clark failed to respond, blamed his attorney and had to cut Thomas and her attorney a check for more than $30,000.

Clark is continuing his battle with the county.

He was sent a packet by Washoe County to sign as an incoming commissioner. The documents indicated he was not to share communications from the county manager's office with the public, something Clark said would violate his rights as an elected official and the Nevada Public Records Act.

Mike Clark, soon-to-be Washoe County Commissioner

"The manager's office sent it to me as an on-board package to sign and fill out," he told This Is Reno. "When I saw what it was, I thought it was outrageous. It was taking away constitutional rights. I think they were hoping I would sign it as part of the on boarding."

Incoming Commissioner Mariluz Garcia signed the documents. Clark, however, said they were full of red flags.

"My first red flag is it said I'm an employee," he told This Is Reno. "I'm not an employee. My second red flag [is that it] was dated back ... August 29 of this year. I wasn't even elected at that point in time.

"So every single line that they wanted me to sign said 'employee,'" he added. "I mean ... they wanted a copy of my passport. They wanted a copy of my driving record. They wanted to pull a credit report on me. They wanted to do a background check, and then they said I couldn't talk about anything that I've seen around there."

The county withdrew the packet after Clark refused to sign it and after This Is Reno asked about it.

"In an attempt to streamline and create consistency to the onboarding process for new commissioners, Washoe County sent information packets with HR documents to both newly elected commissioners," county spokesperson Bethany Drysdale said. "Those packets included confidentiality agreements that some county employees are required to sign.

"However, it was decided that the forms are not pertinent to the office of commissioner, and since only one commissioner filled it out, that form was destroyed and no further action was needed."

Bob Conrad

Bob Conrad is publisher, editor and co-founder of This Is Reno. He has served in communications positions for various state agencies and earned a doctorate in educational leadership from the University of Nevada, Reno in 2011. He is also a part time instructor at UNR.

thisisreno.com

December 15, 2022

CORTEZ MASTO VOTES TO PASS FY2023 NDAA, HIGHLIGHTS NEVADA PRIORITIES SHE SECURED IN LEGISLATION INCLUDING RESPONSIBLE EXPANSION OF THE FALLON RANGE TRAINING COMPLEX

Washington, D.C. – U.S. Senator Catherine Cortez Masto (D-Nev.) voted to pass the *National Defense Authorization Act* (NDAA) for Fiscal Year 2023 and announced the Nevada priorities she helped secure in the bill. Senator Cortez Masto's legislation to responsibly expand the Navy's Fallon Range Training Complex (FRTC) was included in the final NDAA. In addition, Senator Cortez Masto worked so the bill includes additional support for Nevada military installations, pay raises for service members, improved access to quality housing for military families, and support for American allies and partners. The FY2023 NDAA also includes an important update to the Water Resources Development Act (WRDA) that Senator Cortez Masto secured to fund vital Lake Tahoe restoration projects and Western water infrastructure.

"I've always stood up for our service members and their families, and I'm proud I was able to secure critical provisions in this year's final bill to support our military and improve our national security," **said Senator Cortez Masto.** "This legislation includes measures I fought for to increase pay and benefits for service members and their families, maintain and improve Nevada military installations, support our allies, and secure a responsible expansion of the Navy's Fallon Range Training Complex."

The FY2023 NDAA includes a 4.6% pay raise for both military service members and Department of Defense (DoD) civilian employees, measures to improve the quality of military housing, and funding for weapons and defense systems to support our allies and partners, including Israel and Ukraine. In addition, the following legislative initiatives supported by Senator Cortez Masto were included in the Senate passage of the *National Defense Authorization Act of 2023*:

- **Fallon Range Training Complex (FRTC) expansion.**
  - This agreement secured by Senator Cortez Masto will provide the Fallon Range Training Complex (FRTC) with an additional 558,535 acres for military training vital to our national security and designate over 581,887 acres of conservation, wilderness, and other protected areas. It also will hold a total of 18,170 acres of land in trust for the Walker River Paiute and Fallon Paiute Shoshone Tribes and provide the Tribes with vital funding to preserve their history, knowledge, and culture. Additionally, the agreement will allow Churchill County and Lander County to access land for economic growth.
- **Support for Nevada's military installations, including:**
  - $159 million for Naval Air Station (NAS) Fallon Military construction to modernize the base that trains our Navy's Carrier Airwings.
  - $18 million for the operation of the Army National Guard Harry Reid Training Center in Reno.
  - $7.2 million for a dormitory at Nellis Air Force Base to address a housing shortage among junior enlisted service members.
  - $62.6 million for the Nevada Test Site
  - Legislation requiring the Secretary of Defense to conduct a study on opportunities for providing support services to Remotely Piloted Aircraft (RPA) crew, including those stationed at Nevada's Creech AFB.

- **Inclusion of Senator Cortez Masto's priorities in this year's Water Resources Development Act (WRDA), the text of which was included in the NDAA, allowing for:**
    - $50 million to support the U.S. Army Corps of Engineers' (USACE) Lake Tahoe "108 Program" to assist with environmental infrastructure projects in the Lake Tahoe Basin.
    - $415 million for the Western Rural Water program, which supports projects that provide safe water, waste disposal, and pollution control in **rural communities.**
    - $25 million for a pilot program the Senator helped establish to address aquatic invasive species in Alpine Lakes such as Lake Tahoe, Crater Lake, and Yellowstone Lake.

Senator Cortez Masto is a champion in the Senate for our service members and their families, as well as our veterans. Cortez Masto has passed legislation through the annual National Defense Authorization Acts (NDAA) to help veterans exposed to Agent Orange get the treatment they need. As part of the NDAA of 2021,
she secured measures to improve mental health services for members of the National Guard and Reserves, support veterans in getting the retirement benefits owed to them, and increase the transparency and efficiency of the Department of Defense's TRICARE medical billing practices.

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DRINKING WATER > INFRASTRUCTURE FUNDING

NACWA report urges Congress to support low-income water affordability

The association's new report on low-income water affordability challenges highlights dwindling federal investment in water infrastructure, rising income inequality, and rising water and wastewater service charges.

Dec. 15, 2022

The National Association of Clean Water Agencies (NACWA) has issued a new report on low-income water affordability challenges, titled "The Growing U.S. Water Affordability Challenge and the Need for Federal Low-Income Water Customer Assistance Funding."

The association's report shows that rising income inequality is driving heightened affordability challenges for low-income households in every corner of the country, and that federal investments in water infrastructure are currently insufficient to cover the rising cost of delivering water services. Increased federal investments could remove this burden from Americans living at or beneath the poverty level.

Key findings of the report include:

- Passage of the Infrastructure Investment and Jobs Act (IIJA) represents a strong step in the right direction in terms of the federal government reinvesting in water infrastructure.
- However, massive funding gaps between what was authorized and appropriated still exist, totaling roughly $4 billion per year over the five years covered by the legislation. In sum, adjusted for inflation, the federal cost-share of water utility capital investment has fallen from 62.77 percent in 1977 to less than 10 percent in recent years.
- Currently, almost all federal funding for clean and drinking water infrastructure reaches communities through low-interest loan financing, repaid through customers' water rates.
- As public utilities, the overwhelming majority of financing for capital investment projects and operation & maintenance activities comes from individual households through bill payments. Increasing income inequality is leading to heightened affordability challenges for low-income households. As the federal share of water utility investment has declined, income inequality has skyrocketed.
- For the top one percent of Americans, household income has more than tripled since 1979.
- However, for 90 percent of families, income has just increased by roughly 1 percent per year over the past 40 years. The average annual wastewater service charge for a single-family household ($551) has risen at twice the rate of inflation as measured by the Consumer Price Index (CPI) between 2000 and 2021. This average charge of $551 represents 2.1 percent of the 2021 federal poverty income threshold for a family of four ($26,500), up from just 1.3 percent in 2000.
- As agencies continue to respond to emerging challenges and make up for paused rate increases during the worst of the pandemic's economic impacts in 2020 and 2021, utility rates are projected to increase by approximately 4 percent per year from 2022 through 2026.

The NACWA report examined pathways for Congress to address these issues through low-income water customer assistance funding. Long-standing federal programs help American families to afford groceries and home energy bills, but there has never been a permanent program for water assistance.

The IIJA authorized funding for a low-income assistance pilot program carried out by the Environmental Protection Agency (EPA), but no funding has been allocated.

Emphasizing a Need for Investment

Three NACWA public utility members, representing the Jefferson County Commission (serving Birmingham, Ala.), Buffalo Sewer Authority, and Northeast Ohio Regional Sewer District (serving Cleveland, Ohio), hosted a national news conference on Wednesday, Dec. 14, to release top-level findings from the new report. The report emphasizes the dwindling federal investment in clean water infrastructure each year, and the expanding cost-sharing ratio for low-income Americans in impoverished areas.

David Denard, Director of Environmental Services at the Jefferson County Commission, Alabama, which provides wastewater services to the Birmingham, Ala. metropolitan area, said: "In Birmingham, we are very attuned to the circumstances underpinning the emergency next door in Mississippi. Jackson has a poverty rate more than two times the national average, but that's not an anomaly.

There are many communities in different regions across the U.S. with similar infrastructure vulnerabilities, as well as disproportionately high levels of poverty among ratepayers, who are footing the bill. Jackson is a harbinger of a wider national problem — the water affordability challenge — and what NACWA's report tells us is that Congress must take this opportunity to address the wider national issue by providing targeted relief to low-income families."

"Buffalo is a long way from Jackson in a completely different part of the country, but we face many of the same operational challenges," said Oluwole 'OJ' McFoy, General Manager of Buffalo Sewer Authority. "We just experienced a 1,000-year snowstorm that put strain on our system, and we also recognize our obligation to the local community to prioritize low-income water affordability. One-third of Buffalo's 276,000 residents live below the poverty line. And with $500 million in lead service lines to replace and an additional $500 million in combined sewer overflow repairs, we face steep challenges. Our capital investment needs equate to roughly $3600 per person. What we need to do is restore a stronger federal responsibility for funding water infrastructure to ensure that we don't put an impossible burden on the most vulnerable families in our community."

"Funding U.S. water infrastructure is at a crossroads and these decisions will affect utility customers in Northeast Ohio and nationwide," said Kyle Dreyfuss-Wells, CEO, Northeast Ohio Regional Sewer District, which serves Cleveland, Ohio and 61 surrounding communities. "Over the past several decades the cost of providing clean water and drinking water services has risen, while federal dollars have almost disappeared. With growing regulatory mandates, increasingly complex water quality challenges related to nutrients and emerging contaminants, and the urgent need to build climate resilient water systems, these added costs will have a significant impact on low-income customers."

NACWA's experts from Alabama, New York, and Ohio took the opportunity to urge lawmakers in the new Congress to drill down on the water affordability challenge and allocate funding for low-income customer assistance in the Fiscal Year 2023 appropriations legislation, as well as in future annual spending bills.

Sierra Sun

Truckee Donner Public Utility District holds final meeting of 2022

News FOLLOW NEWS | Dec 15, 2022

Submitted to the Sun

TRUCKEE, Calif. – The Truckee Donner Public Utility District Board of Directors held its last board meeting of the year last Wednesday. The bulk of the meeting dealt with typical year-end tasks, including approval of purchases and contracts for 2023, appointment of the board leadership positions for next year, and approval of the 2023 board meeting schedule. In addition, General Manager Brian Wright recognized important new hires and promotions and shared that the district had recently been recognized for its performance on safety.

The district's procurement process is done on an annual basis and defines the way in which the TDPUD obtains critical goods, services, and equipment needed to operate, maintain and modernize the electric and water utilities. For 2023, the board approved $10.9 million in annual procurements.

Following district code, a competitive procurement process must be utilized for most purchases and contract awards, in order to secure the most favorable terms and prices for TDPUD ratepayers. The board must approve all purchases over $15,000, but even for purchases less than that amount, the district still utilizes a competitive procurement process. In some instances where the product or service needed is too specialized to benefit from a bidding process, the district may negotiate directly with vendors or consultants on contract terms.

While procurements are utilized by every department, the district clerk's office oversees the execution of this process and was responsible for the completion of more than 100 procurements this year. Chief Financial Officer Mike Salmon gave special recognition to District Clerk Shanna Kuhlemier and Contract Administrator Regina Cooley for their diligent work on this immense undertaking that is critical to the smooth operation of the TDPUD.

Wright also shared some important staffing updates for the electric department. He announced the hiring of Daniel Price as the TDPUD's new electric operations manager, as well as the promotion of Cody Laplaca to assistant electric operations manager. Price comes to the district with more than 40 years of experience in the electric utility industry working up from a lineman position to an experienced trainer and manager. Laplaca, who had been serving as the interim assistant manager for seven months, has been with TDPUD for more than 11 years. He grew up in the foothills and has spent his whole life recreating in Truckee.

Safety is a top priority at the TDPUD, and the district's efforts to maintain a safe workplace have not gone unnoticed. At the meeting, Wright announced that the president of the Association of California Water Agencies Joint Powers Insurance Authority presented the TDPUD with a special recognition award for safety. ACWA JPIA is a provider of insurance services to public water utilities, and the award recognized the district's low ratio of claims. While safety on its own is important to prioritize, limited claims have a positive effect on insurance rates, and overall utility operating costs.

Wright and Water Utility Director Chad Reed recognized staff for the completion of the district's Water SCADA Replacement Project. Supervisory Control and Data Acquisition is a system that is used in industries with automated and remote control of services. Th impressive, decade-long project was a collaborative effort between IT, water utility and electric utility staff to replace the existing water utility SCADA with a modern system that is easily customized and expanded to meet the evolving needs of today's water utility operations.

The final year-end housekeeping items the board acted on were the appointment of board leadership positions and the adoption of the 2023 board meeting calendar. Starting Jan.1, Vice President Jeff Bender will begin his term as board president, and Director Tony Laliotis will become vice president, as was decided via nomination and a unanimous vote by their fellow board members.

TDPUD board meetings are typically held monthly on the first Wednesday of the month, with an additional meeting each quarter. The newly adopted 2023 meeting schedule, as well as additional information about TDPUD board meetings and access to agendas, minutes, live streaming and archived video can be found at tdpud.org/boardmeetings.

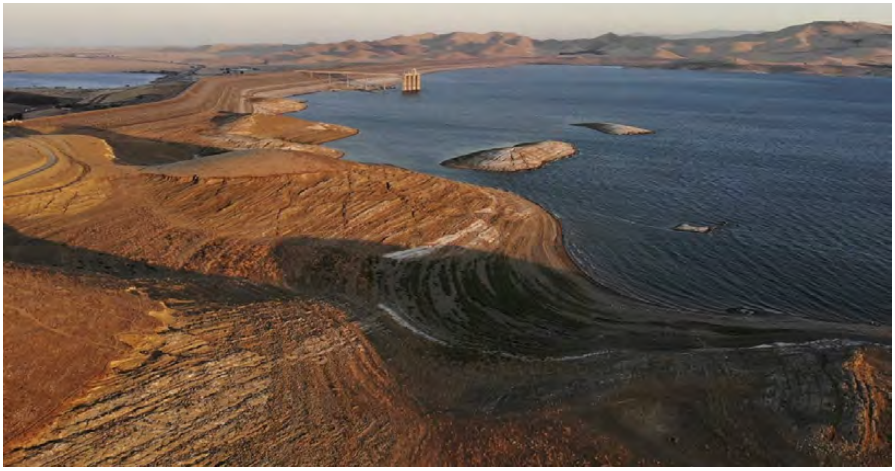
Planning for Dry Times: The West Considers More Reservoirs and Aquifers

STATELINE ARTICLE

December 16, 2022

By: Matt Vasilogambros

Read time: 6 min



The San Luis Reservoir, shown in September, stores water for agricultural irriga on in the San Joaquin Valley in Central California but has had significantly low water levels during the drought. Some local water officials want to expand the number of reservoirs throughout the state.

Terry Chea / The Associated Press

Read more *Stateline* coverage of how communi es across the West are grappling with drought that's worsening because of climate change.

SAN DIEGO, Calif. — As parched California receives much needed rain and snow this winter, some local water officials are calling on state leaders to invest in new infrastructure projects that will store freshwater for inevitable dry mes to come.

The worst megadrought in 1,200 years is devasta ng the water supply in the Western United States. It's drying up the Colorado River basin, a major North American river system, while also deple ng reservoirs and underground aquifers and forcing communi es to make dras c cuts to their freshwater use.

Western states can no longer rely on snowmelt and rain to supply their communi es in a drier, more arid landscape caused by climate change, say water experts.

Environmental groups have called for increased conserva on efforts, such as pushing people to limit watering of ornamental lawns and upgrade to more efficient appliances. And they want officials to invest more in wastewater recycling or desalina on projects. But some local water officials in California and across the West see a massive opportunity in storing rainwater in new or expanded reservoirs and groundwater aquifers.

"We can't just keep conserving our way out of this," said Gary Arant, general manager at Valley Center Municipal Water District, which serves communities throughout San Diego County. "Our supplies are becoming less and less reliable, our population is growing, our economy is growing. We're at a point where we need to make investments in the statewide water system."

Arant is one of several dozen local water officials, along with ci es and business associations, that are part of the Solve the Water Crisis statewide coalition. The group is calling on California leaders to invest more heavily in water infrastructure and be er coordinate the response to the drought, including by creating new ways to store freshwater.

With $8.3 billion in new federal money designated for drought resilience nationwide, as part of the bipar san infrastructure law Congress passed earlier this year, now is the me to make those investments, Arant argued.

But critics say the water shortage requires other solutions. Needed ac ons include water recycling, cutbacks, desalination, wetlands restoration and more efficient use, especially by agriculture, said Heather Cooley, director of research at the Pacific Ins tute, an Oakland-based think tank focused on water issues.

“Adding more to storage isn’t really doing much,” Cooley said. “It doesn’t create more water. We’ve really met our limits of traditional supplies.”

In recent years, the drought has meant less snow in the mountains of California. When that snow melts in the spring, it replenishes reservoirs statewide. But snowpack has been unreliable in this three-year drought.

Without snowpack, precipitation instead has come in the form of sporadic and brief periods of heavy rain and atmospheric rivers — regions in the atmosphere that carry water vapor that can drop massive amounts of precipitation. The West’s water systems were not designed to handle such intense downpours, said Andrew Ayres, a research fellow with the Public Policy Institute of California, a nonpartisan think tank.

But with the right stormwater capture projects, that water not only can be stored in above-ground reservoirs but also injected underground to recharge depleted aquifers, especially in agricultural parts of the state that have over-pumped to meet their needs, he said. Local water officials also can divert rainwater to recharge ponds, where the water will slowly seep underground.

“Our success in managing the really tough dry mes is going to start depending more and more on how we manage the wet mes,” he said. “Increasingly, we’re going to have to do more deliberate planning, not only for new projects, but effec ve management of exis ng projects to get ourselves set up for dry mes that are coming in the future.”

Despite recent heavy snows in the Sierra Nevada Mountains, the past three years have been the driest on record in California. As of last week, 85% of the state is s ll in severe, extreme or excep onal drought condi ons, according to the U.S. Drought Monitor, which is operated out of the University of Nebraska-Lincoln in partnership with the federal government.

With these ongoing drought conditions, the state cannot rest easy when it gets a brief reprieve of precipitation, said Kimberly Thorner, general manager of the Olivenhain Municipal Water District, which serves parts of San Diego County. The state must act now to invest in its water reserves, she said.

In October, U.S. Interior Department officials allocated $210 million throughout the West for new water infrastructure. This includes three projects in California that would raise dams and create a new reservoir off the Sacramento River that would capture rainwater. That new Sites Reservoir is set to break ground in 2024.

California lawmakers also have earmarked $8 billion in new water infrastructure over the next three years, which includes hundreds of millions for storage projects. The statewide water strategy, which Democra c Gov. Gavin Newsom released in August, outlines several ways the state could expand storage opportuni es through a “streamlined” permi ng process.

Thorner, who is also part of the Solve the Water Crisis coali on, applauds these commitments from federal and state officials. However, she said she will con nue to press state officials to make historic investments in water infrastructure, including new or raised reservoirs.

“A plan is great, but we need ac on,” she said. “We need to do something different.”

Adding more reservoirs might be challenging, however. The most economical and effec ve sites already have reservoirs, said Jay Lund, vice director of the Center for Watershed Sciences at the University of California, Davis.

“Building new or expanded reservoirs is o en expensive and provides much less water than people might think,” he said in an email to Stateline. “New reservoirs also o en involve sizable addi onal environmental damages. So, calls for new reservoirs usually go unrequited.”

In lieu of new reservoirs, it has become more common throughout the West to instead store addi onal water as groundwater, pumping it into underground aquifers for later use, Lund said. This tends to be less expensive and more flexible during droughts, he said, adding that it is easier to permit.

Storage isn’t the issue, said Cooley, of the Pacific Ins tute. It’s the water supply. She points to the Colorado River basin, which provides water for Arizona, California and Nevada and has four mes the storage capacity than the average annual flow of the waterway.

Lake Mead and Lake Powell, two of the country's largest reservoirs, are dangerously low and are projected, by some es mates, to hit a water level known as dead pool in the next two years if condi ons con nue, officials warn. Dead pool refers to a water level too low to operate the electricity-genera ng turbines in the dam or to allow water to flow downstream.

In October, California, which takes in more Colorado River water than any other state, offered to cut back the amount it receives from the waterway star ng next year.

Cooley said that water shortage requires Western states to look for nontradi onal supplies, including conserving water, recycling wastewater, desalina ng ocean and brackish water, fixing leaks in the water distribu on system, replacing ornamental lawns and inves ng in more efficient home appliances, such as dishwashers and washing machines.

State and local water officials also should invest in restoring wetlands and forests, which act as natural conduits that flow rain into groundwater aquifers, Cooley said. Overall, there are millions of acre-feet of water in untapped poten al, according to an April report from the Pacific Ins tute, which Cooley helped author.

California's agricultural sector, which uses more than 70% of the state's water supply, also needs to use that water more efficiently and effec vely, she added.

But farmers already are feeling the pinch, said Mike Wade, execu ve director of the California Farm Water Coali on, a nonprofit that educates the public on the agricultural sector's water supply.

Draconian cuts to water use are not going to sustain California farmers' ability to feed the rest of the country, he said. Moving ahead with new water projects, such as the Sites Reservoir, is how the state should proceed, he said.

"They are the facili es of tomorrow that gives us flexibility in managing the resource that we have today," Wade said. "Planning for scarcity, I don't think, is the long-term solu on for California."

The uncertainty over state water ac ons leaves local water officials in a precarious posi on as they face poten al cutbacks to water usage, possibly forcing them to limit residents' intake, said Arant, a the Valley Center Municipal Water District.

"I've got my hand on the valve and my eyes on the horizon looking for rain clouds," he said. "And if I don't see rain clouds, I'm going to start squeezing the valve."

STATELINE ARTICLE
December 16, 2022
Topics: Energy and Environment
Places: Arizona, California & Nevada

AUTHORS

Matt Vasilogambros
Staff Writer
Stateline

DECEMBER 16, 2022

Earth's water is 4.5 billion years old, says new study

by Evan Gough, Universe Today

Stars form in molecular clouds, vast conglomerations of mostly hydrogen. This is a composite image of the Corona Australis molecular cloud from the ESA's Herschel and Planck Space Observatories. Credit: ESA/ Herschel/Planck; J. D. Soler, MPIA

The origin of Earth's water has been an enduring mystery. There are different hypotheses and theories explaining how the water got here, and lots of evidence supporting them.

But water is ubiquitous in protoplanetary disks, and water's origin may not be so mysterious after all.

A research article in *Elements* shows that other young solar systems have abundant water. In solar systems like ours, water is along for the ride as the young star grows and planets form. The evidence is in Earth's heavy water content, and it shows that our planet's water is 4.5 billion years old.

The article is "We Drink Good 4.5-Billion-Year-Old Water," and the authors are Cecilia Ceccarelli and Fujun Du. Ceccarelli is an Italian astronomer at the Institute for Planetary Sciences and Astrophysics in Grenoble, France. Du is an astronomer at the Purple Mountain Observatory in Nanjing, China.

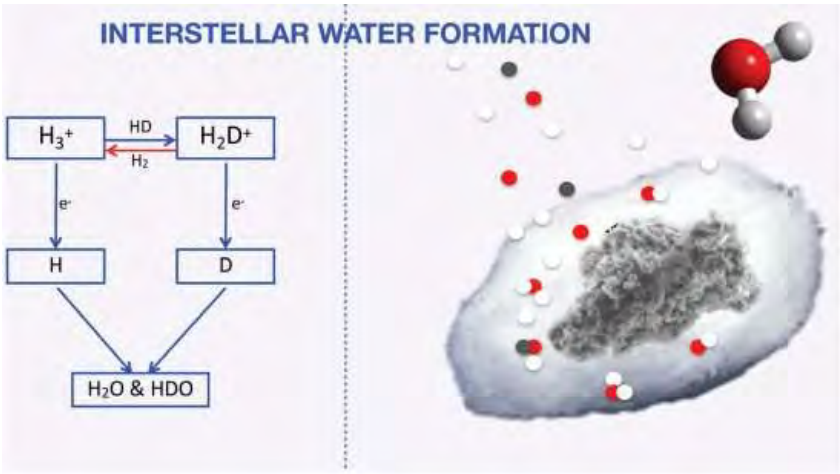
The formation of a solar system starts with a giant molecular cloud. The cloud is mostly hydrogen, water's main component. Next are helium, oxygen, and carbon, in order of abundance. The cloud also contains tiny grains of silicate dust and carbonaceous dust. The research article takes us through the history of water in our solar system, and this is where it starts.

Out here in the cold reaches of a molecular cloud, when oxygen encounters a dust grain, it freezes and adheres to the surface. But water isn't water until hydrogen and oxygen combine, and the lighter hydrogen molecules in the cloud hop around on the frozen dust grains until they encounter oxygen. When that happens, they react and form water ice—two types of water: regular water and heavy water containing deuterium.

The water ice forms a frozen mantle around individual dust grains. Credit: Ceccarelli and Du, 2022

Deuterium is an isotope of hydrogen called heavy hydrogen (HDO.) It has a proton and one neutron in its nucleus. That separates it from "regular" hydrogen, called protium. Protium has a proton but no neutron. Both these hydrogen isotopes are stable and persist to this day, and both can combine with oxygen to form water.

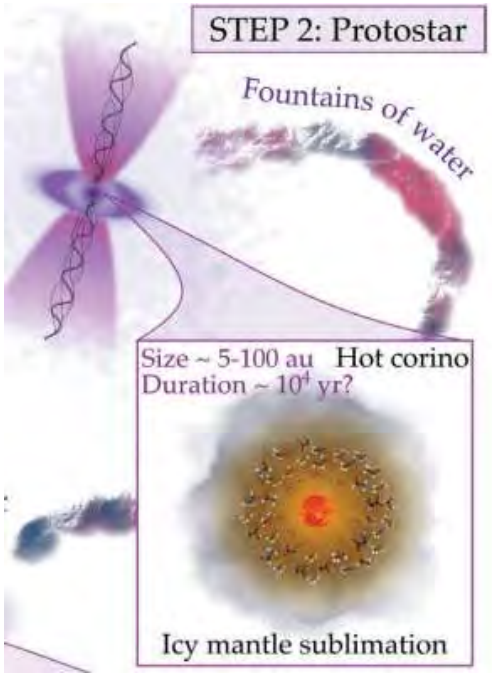
When water ice forms a mantle on dust grains, the authors call it the cold phase, step one in the process they outline in their article.



This figure from the study shows how water forms on tiny dust grains. Crucially, some of the water is heavy water
(HDO.)

Gravity begins to exert itself in the cloud as matter clumps in the center. More mass falls into the center of the molecular cloud and starts forming a protostar. Some of the gravity is converted into heat, and within a few astronomical units (AU) of the cloud's center, the gas and dust in the disk reach 100 Kelvin.

100 K is bitterly cold in Earthly terms, only –173 degrees Celsius. But in chemical terms, it's enough to trigger sublimation, and the ice changes phase into water vapor. The sublimation occurs in a hot corino region, a warm envelope surrounding the cloud's center. Though they also contain complex organic molecules, water becomes the most abundant molecule in corinos.



In step two, the protostar hasn’t begun fusion yet. But it still generates enough heat to sublimate the water ice on dust grains into vapour. Credit: Ceccarelli and Du, 2022

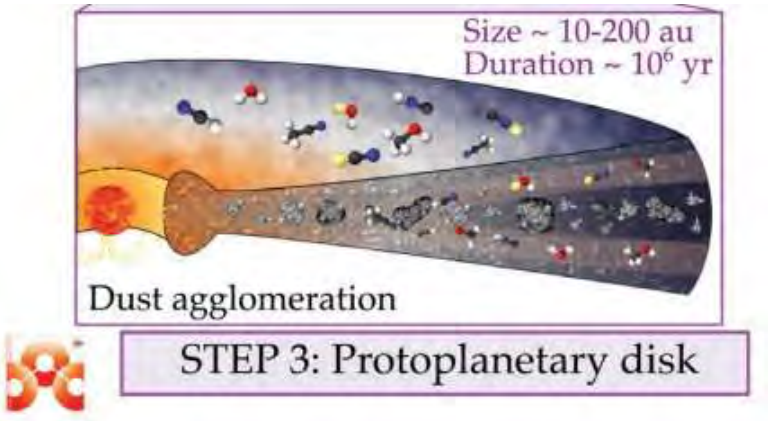
Water is abundant at this point, though it's all vapor. "… a typical hot corino contains about 10,000 times the water in the Earth's oceans," the authors write.

That's step two in the process outlined by the authors, and they call it the protostar phase.

Next, the star begins to rotate, and the surrounding gas and dust form a flattened, rotating disk called a protoplanetary disk. Everything that will eventually become the solar system's planets and other features is inside that disk.

The young protostar is still gathering mass, and its life of fusion on the main sequence is still well in its future. The young star generates some heat from shocks on its surface, but not much. So the disk is cold, and the regions furthest away from the young protostar are the coldest. What happens next is crucial, according to the authors.

The water ice that formed in step one is released into gas in step two but recondenses again in the coldest reaches of the protoplanetary disk. The same population of dust grains is again covered in an icy mantle. But now, the water molecules in that icy mantle contain the history of the water in the solar system. "Thus, dust grains are the guardians of water inheritance," the authors write.



As the protostar continues to gather mass, it begins to rotate. The gas and dust form a rotating disk centred on the star. The water vapour from step two recondenses, and the dust grains are again covered in icy mantles. But this time, the water ice retains a record of what it's been through. Credit: Ceccarelli and Du, 2022

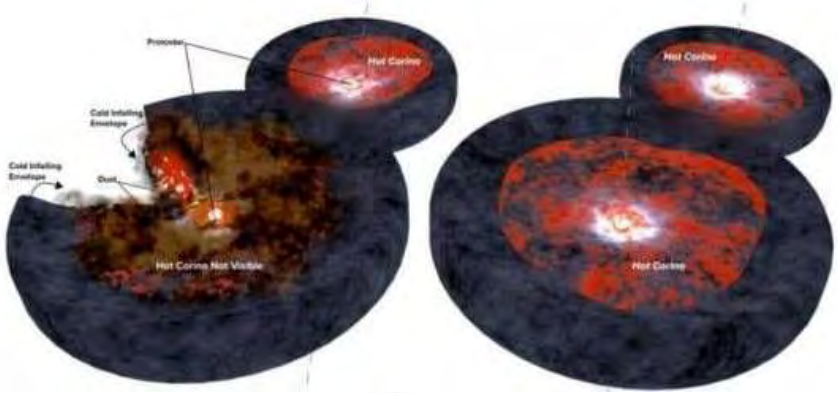
That's step three in the process.

In step four, the solar system begins to take shape and resemble a more fully-formed system. All the things we're accustomed to, like planets, asteroids, and comets, start forming and taking up their orbits. And what do they originate from? Those tiny dust grains and their twice-frozen water molecules.

This is the situation we find ourselves in today. While astronomers can't travel back in time, they're getting better at observing other young solar systems and finding clues to the entire process. Earth's water contains a critical hint, too: the ratio of heavy water to regular water.

Some detail is left out of the simple explanation given so far. When water ice forms in step one, the temperature is extremely low. That triggers an unusual phenomenon called super-deuteration. Super-deuteration introduces more deuterium into the water ice than at other temperatures.

Deuterium was only formed in the seconds following the Big Bang. Not much of it formed: only one deuterium for every 100,000 protium atoms. That means that if the deuterium was evenly mixed with the solar system's water, the abundance of heavy water would be expressed as 10^{-5}. But there's more complexity to come.



Hot corinos have a higher abundance of heavy water than other regions. This image shows a pair of hot corinos around a young binary star system named IRAS 4A. Credit: Bill Saxton, NRAO/AUI/NSF

In a hot corino, the abundance changes. "However, in hot corinos, the HDO/H_2O ratio is only a bit less than 1/100," the authors explain. (HDO is water molecules containing two deuterium isotopes, and

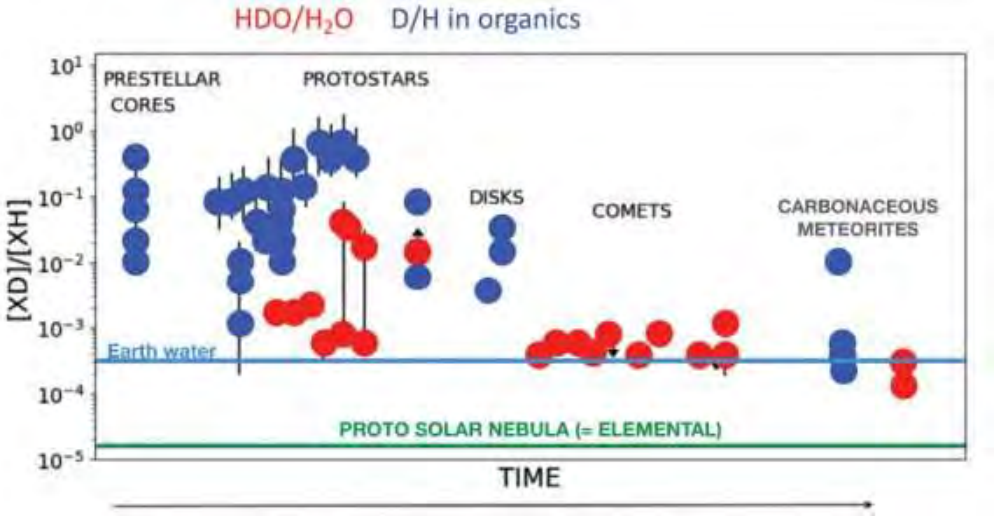
H O is regular water containing two protium isotopes.)

There's even more extremity. "To make things even more extreme," the authors explain, "the doubly deuterated water D2O is 1/1000 with respect to H_2O, namely about 10^7 times larger than what would be estimated from the D/H elemental abundance ratio."

The ratios contain such large abundances of deuterium because of super-deuteration. At the moment that ice forms on the surfaces of the dust grains, there's an enhanced number of D atoms compared to H atoms landing on the grain surfaces. The in-depth chemical explanation is beyond the scope of this article, but the conclusion is clear. "There are no other ways to obtain this large amount of heavy water in hot corinos nor in general," the authors write. "Therefore, abundant heavy water is a hallmark of water synthesis in the cold molecular cloud clump during the STEP 1 era."

The important thing so far is that there are two episodes of water synthesis. The first happens when the solar system hasn't formed yet and is only a cold cloud. The second is when planets form. The two happen in different conditions, and those conditions leave their isotopic imprint on the water. Water from the first synthesis is 4.5 billion years old, and the question becomes, "How much of that ancient water reached Earth?"

To find that out, the authors observed the only two things they could: the amount of water overall and the amount of deuterated water. As the authors put it, "… namely, the ratio of heavy over normal water, HDO/H_2O."



This figure from the study shows how water deuteration, given by the red symbols showing the HDO/H2O ratio, diminished from the hot corino stage, to the comets, and then to the asteroid fragments that make up the carbonaceous meteorites. Critically, the terrestrial ratio shown by the blue line is precisely the same as the carbonaceous meteorites. The terrestrial value is also ten times greater than the original value in the proto-solar nebule in step one. Credit: Ceccarelli and Du, 2022

More than enough water was created to account for Earth's water. Remember that the amount of water in the hot corino was 10,000 times more than Earth's water, and its HDO/H2O ratio is different from the water formed in the initial cloud. How much of the corino water reached Earth?

A hint can be found by comparing HDO/H2O values in terrestrial water with those of hot corinos.

Hot corinos are the only place we've observed HDO in any still-forming, solar-type planetary systems. In previous research, scientists compared those ratios with ratios in objects in our solar system—comets, meteorites, and Saturn's icy moon Enceladus. So they know that Earth's heavy water abundance, the HDO/H_2O ratio, is about ten times greater than in the universe and at the beginning of the solar system. "'Heavy over normal' water on Earth is about 10 times larger than the elemental D/H ratio in the universe and consequently at the birth of the solar system, in what is called the solar nebula," the authors explain.

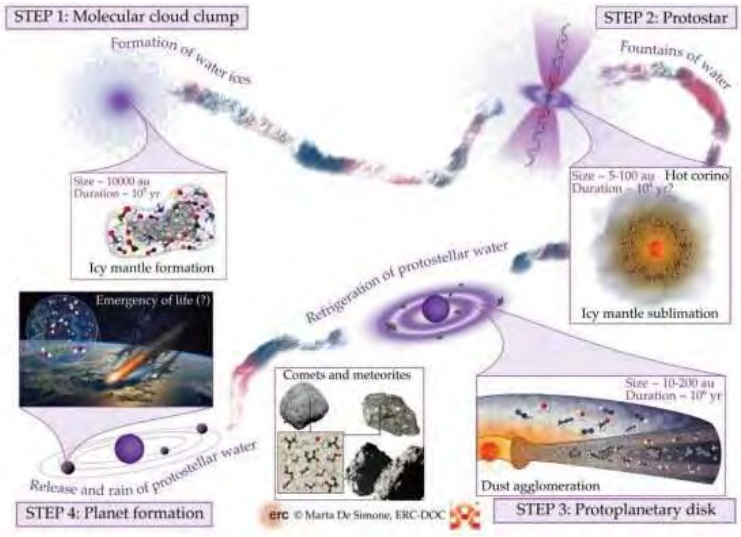
The results of all this work show that between 1% and 50% of Earth's water came from the initial phase of the solar system's birth. That's a wide range, but it's still a significant piece of knowledge.

The authors wrap things up in their conclusion. "The water in comets and asteroids (from which the vast majority of meteorites originate) was also inherited since the beginning in large quantities. Earth likely inherited its original water predominantly from planetesimals, which are supposed to be the precursors of the asteroids and planets that formed the Earth, rather than from the comets that rained on it."

Delivery by comets is another hypothesis for Earth's water. In that hypothesis, frozen water from beyond the frost line reaches Earth when comets are disturbed and sent from the frozen Oort Cloud into the inner solar system. The idea makes sense.

But this study shows that may not be true.

It still leaves unanswered questions, though. It doesn't explain how all the water reached Earth. But the study shows that the amount of heavy water on Earth is at least the beginning of figuring this out.



The authors illustrated a simplified account showing four steps in the creation of the Solar System's water. Credit: Ceccarelli and Du, 2022

"In conclusion, the amount of heavy water on Earth is our Ariadne thread, which can help us to come out from the labyrinth of all possible routes that the solar system may have taken," they explain.

Earth's water is 4.5 billion years old, just like the article's title says. At least some of it is. According to the authors, planetesimals probably delivered it to Earth, but exactly how that happens isn't clear. There's a lot more complexity that scientists need to sort through before they can figure that out. "The issue is quite involved because the origin and evolution of Earth's water is inevitably connected with other important participants on this planet, e.g., carbon, molecular oxygen, and the magnetic field," the authors write.

These things are all wrapped up together in how life originated and how worlds formed. Water likely played a role in forming the planetesimals that delivered it to Earth. Water likely played a role in sequestering other chemicals, including the building blocks of life, onto rocky bodies that delivered them to Earth.

Water lies at the center of it all, and by showing that some of it dates back to the very beginnings of the solar system, the authors have provided a starting point for figuring the rest of it out.

> "Here, we presented a simplified early history of the Earth's water according to the most recent observations and theories," they write. "A good fraction of terrestrial water likely formed at the very beginning of the solar system's birth when it was a cold cloud of gas and dust, frozen and conserved during the various steps that led to the formation of planets, asteroids, and comets and was eventually transmitted to the nascent Earth."

"How the final passage happened is another fascinating chapter," they conclude.

More information: Cecilia Ceccarelli et al, We Drink Good 4.5-Billion-Year-Old Water, *Elements* (2022). DOI: 10.2138/gselements.18.3.155

Andre Izidoro et al, Origin of Water in the Terrestrial Planets: Insights from Meteorite Data and Planet Formation Models, *Elements* (2022). DOI: 10.2138/gselements.18.3.181

Provided by Universe Today

Citation: Earth's water is 4.5 billion years old, says new study (2022, December 16) retrieved 21 December 2022 from https://phys.org/news/2022-12-earth-billion-years.html

California's World-Leading Conservation Goals Adopted Globally

Published: Dec 19, 2022

SACRAMENTO – Governor Gavin Newsom today issued the following statement after the vast majority of countries in the world signed a United Nations agreement to protect 30 percent of Earth's lands and oceans by 2030.

"Two years ago, California made history as the first state in the nation to set a goal to conserve 30 percent of our beautiful land and coastal waters by 2030 – a model for global action to protect our planet," said Governor Newsom. "With the agreement signed in Canada, the rest of the world joins our pledge in one of the most transformative moments of human progress we've witnessed in our lifetimes. On the heels of losing mountain lion P-22, which inspired us to redouble our efforts to protect California's diverse species and habitats, we're reminded more than ever how important this work is. Together, with the weight of the world now behind us, we will do our part to leave this world and its natural beauty better off for future generations."

In April, Governor Newsom released the Pathways to 30×30: Accelerating Conservation of California's Nature, which outlines how to achieve the state's first-in-the-nation goal to conserve 30 percent of California's lands and coastal waters by 2030 in order to protect biodiversity, expand access to nature and tackle climate change. The strategy followed the Governor's executive order in October 2020, establishing the 30×30 goal.

California has conserved 24 percent of its land and 16 percent of coastal waters. To reach 30 percent by 2030, the state's strategy lays out several concurrent pathways, including accelerating regionally-led conservation, buying strategic lands for conservation and access, expanding voluntary conservation easements, and aligning investments to maximize conservation benefits.

The One Thing that Grows in the West Without Water: Violence

A lot of people are going to be unhappy as a dwindling Colorado River reshapes the U.S.

By Charles P. Pierce PUBLISHED: DEC 19, 2022

RJ Sangosti/MediaNews Group/The Denver Post via Getty Images // Getty Images

"*Either you bring the water to L.A. or you bring L.A. to the water.*" —*Noah Cross,* "Chinatown"

There is a very large portion of the 48 contiguous United States in which non-nomadic human beings were not meant to live. The reason for this is that there's not enough water for them, and human beings need water to live.

According to some estimates, 40 million human beings live there at the moment, and a lot of effort has been made over the centuries to bring water to them so that they can drink it, water 5 million acres of crops with it, and basically continue to live. Central to this has been the Colorado River. And now, due to extended drought, overuse, and the climate crisis, the Colorado River is dying, and if something isn't done quickly, it's going to have a lot of company. From the *Washington Post:*

> **The federal government has called on the seven Western states that rely on Colorado River water to cut usage by 2 to 4 million acre-feet — up to a third of the river's annual average flow — to try to avoid such dire outcomes. But the states have so far failed to reach a voluntary agreement on how to make that happen, and the Interior Department may impose unilateral cuts in coming months. "Without immediate and decisive actions, elevations at Lake Powell and Mead could force the system to stop functioning," Tommy Beaudreau, the Interior Department's deputy secretary, told a conference of Colorado River officials here Friday. "That's an intolerable condition that we won't allow to happen."**
>
> **Many state water officials fear they are already running out of time. Ted Cooke, general manager of the Central Arizona Project, which delivers Colorado River water to central Arizona, said that "there's a real possibility of an effective dead pool" within the next two years. That means water levels could fall so far that the Glen Canyon and Hoover dams — which created the reservoirs at Lake Powell and Lake Mead — would become an obstacle to delivering water to cities and farms in Arizona, California and Mexico.**

The strange and violent political moment through which we are presently living does not fill me with optimism about the federal government's ability to get seven states to agree on a breakfast menu, let alone agree to a cooperative strategy that might cause millions of suburban lawns to go brown. In fact, it could be argued that our current strange and violent political moment was born in the western deserts.

For 40 years or so, that part of the nation has been central to all kinds of anti-government environmental activism, including actions that come very close to violating the sedition statutes. The "Wise Use Movement," founded in Nevada in 1988, became an umbrella organization for anti-regulatory activities, many of them financed by corporate money derived from the extraction industries. A great deal of the twisted "freedom" rhetoric we heard from the Capitol steps on January 6, 2021, was beta-tested in what is now the increasingly thirsty West.

> **The negotiations will ultimately have to weigh cuts in rapidly growing urban areas against those in farming communities that produce much of the country's supply of winter vegetables. In the complex world of water rights, farms often have priority over cities because they've been using river water longer. Unlike in past negotiations, water managers now expect that cuts will affect even the most senior water users. The states of the Upper Colorado River Basin — Colorado, New Mexico, Utah and Wyoming — say it is difficult to specify how much they can cut because they are less dependent on allocations from reservoirs and more on variable flows of the river. The lower basin states — California, Arizona and Nevada— also consume far more water.**

One of the most poignant parts of this crisis is that the Colorado River no longer reaches the sea. It peters out in the Sonoran Desert in Mexico. According to the U.S. Geological Survey:

> **The river comes to an end just south of the multicolored patchwork of farmlands in the northwestern corner of the image and then fans out at the base of the Sierra de Juarez Mountains. Only about 10 percent of all the water that flows into the Colorado River makes it into Mexico and most of that is used by the Mexican people for farming.**

CHARLES P. PIERCE

Charles P Pierce is the author of four books, most recently *Idiot America*, and has been a working journalist since 1976. He lives near Boston and has three children.

reno gazette journal

OPINION *This piece expresses the views of its author(s), separate from those of this publication.*

Drought resiliency for Nevada

Bill Douglass and Jennifer Satre

Published 2:00 p.m. PT Dec. 19, 2022

This opinion column was submitted by Bill Douglass and Jennifer Satre, who serve on the Board of Trustees for The Nature Conservancy in Nevada.

The water crisis in the Colorado River Basin is a hot topic these days in the national and international media. While it might seem that the issues affecting it are germane only to Las Vegans, and therefore have little impact on us living here in Reno, this is not the case. The same drought is drying up the Truckee, Carson, Walker and Humboldt river basins while lowering ground water reserves throughout the state. The projected impacts of climate change affect us all. Given that there are 40 million Americans dependent largely upon the Colorado River drainage for their water (including a majority of our state's population), and that a significant proportion of this nation's agriculture is irrigated by the Colorado, what is at stake is the future viability of the entire American Southwest.

Colorado River Basin stakeholders have been developing solutions to adapt to a drier future for many years. Indeed, Las Vegas has pioneered many innovative approaches to municipal water conservation. It currently uses half as much water as it did prior to its latest million person increase in its population. In addition to reactive short-term measures that serve as temporary fixes, we also must simultaneously work on proactive long-term solutions that ensure a sustainable and resilient river system for future generations. In the face of unpredictable climate and weather, we must do more with what we can control: future water demands and the ways of meeting them.

Importantly, nature needs to be part of the equation. Nature-based measures can provide cost-effective ways to implement water management solutions. Nature provides baseline ecosystem services that benefit everyone along all of Nevada's rivers. Nature needs to be included in the decisions that are made.

More: Nearly half the US has endured a drought in 2022. Will it get worse? Yes, experts say.

As we face an unprecedented drought in the driest state in the nation, it is critical that the Nevada Legislature fully fund the Division of Water Resources, the agency charged with conserving, protecting, managing and enhancing our state's water resources. In many water basins, information collected in the '60s and '70s is being used to determine how much water is available for use today, let alone tomorrow. There is a critical need to update this data for the 256 hydrographic basins in Nevada. Additionally, the Division needs adequate staff to manage this critical resource and make decisions to ensure there is water for Nevadans far into the future. As climate change portends an even drier future for our region, our best defense is a fully resourced water agency to ensure resiliency for both people and nature in Nevada.

We western water users are fortunate to have $4 billion in drought mitigation funding from the recently passed federal Inflation Reduction Act. These funds could be used to incentivize actions that will promote adaptation and build long-term resilience for communities, agriculture, and the environment. Funds could help agricultural operations update outdated irrigation infrastructure which could, if done thoughtfully, save water and boost river flows. We might fund the permanent retirement of water rights, especially where overuse is creating conflicts and detrimentally impacting nature. The funds could restore wet meadows in forests, riparian and upland ecosystems to improve water retention and storage capacities of natural ecosystems.

Across Nevada, we need to implement long-term drought mitigation solutions to ensure resiliency for our water resources and the people and nature that depend on them. It is only by working together cooperatively — all communities, local water jurisdictions, tribes, states and water users — that we will mitigate the water crisis of the American Southwest.

Bill Douglass and Jennifer Satre serve on the Board of Trustees for The Nature Conservancy in Nevada.

Have your say: How to submit an opinion column or letter to the editor

Draft spending bill includes $140 million for new water treatment in Las Vegas

KUNM | By Alice Fordham

Published December 20, 2022 at 5:44 PM MST

Alice Fordham /

In the steep slopes above the Gallinas River are swaths of trees and soil burned by the Calf Canyon/Hermits Peak re, at risk of washing into the river and contaminating the only municipal water supply for Las Vegas

Up to $140 million could be heading to the city of Las Vegas for a new water treatment system. The Calf Canyon/Hermits Peak fire burned the Gallinas River watershed, filling the city's primary water supply with ash and debris when floods poured down burn scars.

The proposed funding is included in a draft omnibus spending bill that Congress could pass this week. The appropriation would be incorporated into the legislation passed earlier this year that promised to compensate victims of the fire for everything they lost, because the huge blaze was accidentally started by a federal agency, the US Forest Service.

In Las Vegas, Mayor Louie Trujillo said that the Gallinas River is likely to have more ash and debris in it, indefinitely.

"The river is damaged and it's broken," he said. "And so we will eventually have to replace the entire filtration system for the community."

The city nearly ran out of water earlier this year, because its filtration system could no longer handle the river's contaminated water. For now, a workaround has been built that uses reservoir water but Trujillo said he is not sure how long that will function.

So, the city wants to build a new water treatment system, and, as drought intensifies, a more efficient one.

"We're also looking at a reuse system where we are going to reuse our effluent water and convert it into a quality of drinking and blend it into our drinking water," he said.

This story's headline has been updated to reflect that that actual proposed amount is$140 million.

Alice Fordham

Alice Fordham joined the news team in 2022 after a career as an international correspondent, reporting for NPR from the Middle East and later Latin America and Europe. She also worked as a podcast producer for The Economist among other outlets, and tries to meld a love of sound and storytelling with solid reporting on the community. She grew up in the U.K. and has a small jar of Marmite in her kitchen for emergencies.

Water authority lays out Colorado River plan to protect Lake Mead, Lake Powell

Bathtub rings show how low Lake Powell levels have dropped Tuesday, June 7, 2022, in Page, Ariz. (AP Photo/Brittany Peterson)

By Colton Lochhead Las Vegas Review-Journal

December 20, 2022 - 5:42 pm

The Southern Nevada Water Authority has a plan for how the seven states that rely on the Colorado River can protect Lake Mead and Lake Powell.

But whether the other six states have any interest in backing that plan remains to be seen.

The water authority on Tuesday outlined how it thinks the Colorado River basin states and the federal government can drastically cut back on water use along the dwindling Colorado next year in order to keep water levels at its two major reservoirs from crashing further and threatening putting their ability to deliver water downstream and generate hydropower.

The plan, submitted to the Department of Interior, calls for signi cant alterations to the current drought guidelines for the river's two main storage reservoirs and cuts across the basin of more than 2 million acre feet in water use starting next year.

"While the magnitude of water use reduction is striking, it is necessary, achievable, equitable, and e ective," the water authority wrote in their letter submitted Tuesday.

Speci cally, the water authority's proposal calls for:
— Accounting for the more than 1.5 million acre feet of water lost along the river system each year to evaporation and other system losses that would e ectively act as reductions in the lower basin, about half of which would come from California's allocation.
— Earlier triggers for mandated water delivery cuts in the lower basin states of Nevada, Arizona and California, with, with additional cuts if deemed necessary by the federal government.
— Continued releases from reservoirs upstream of Lake Powell and further modi cations to releases at Glen Canyon Dam when Lake Powell's elevations are projected to near elevations that would put hydropower generation at risk.
— Additional mandatory cuts of 500,000 acre feet from the four states in the upper basin — Colorado, New Mexico, Utah and Wyoming.

Two decades of shrinkage

The drought-stricken river has seen its waters shrink substantially since 2000. Current guidelines are based on a river that sees roughly 15 million acre-feet flowing through it per year, but flows over the last 20 years are closer to 12.2 million acre feet, the authority highlighted in its letter.

Those decades of low inflows into the Colorado River combined with continued overtaxing of the system by its users have "pushed the river to a breaking point," the authority wrote.

Recent modeling from the Bureau of Reclamation show water levels at Lake Mead could fall below the minimum elevation needed for Hoover Dam to generate hydropower by 2024, and fall to its "dead pool" elevation of 895 feet by 2025, meaning that water would no longer be able to pass through the dam downstream to California, Arizona and Mexico.

"It is well past time to prohibit the inefficient delivery, application, or use of water within all sectors and by all users; there simply is no water in the Colorado River System left to waste and each industrial, municipal, and agricultural user should be held to the highest industry standards in handling, using, and disposing of water," the authority wrote.

States thus far have proposed only smaller plans for reducing consumption along the river. California recently said it will conserve up to 400,000 acre feet of water, or about 9 percent of its annual allocation, starting next

year. And the Upper Colorado River Commission last week kicked off a $125 million plan to pay farmers and other water users to conserve water, although the states did not say how much water that program is expected to conserve.

'About time'

Kyle Roerink, executive director of Great Basin Water Network, said that it's "about time the chorus grows larger for mandatory for upper basin cuts."

"It's unprecedented to not only hear an agency take a realistic look, but to also look at the upper basin to say that there needs to be more done among Colorado, Utah, Wyoming and New Mexico," he said.

In October, the Bureau of Reclamation started the process of revising the current drought guidelines and has tasked the basin states with coming up with proposals to cut water use along the river by 2 to 4 million acre feet annually starting next year.

O cials with the Department of Interior have said that states have until the end of January to work out a consensus agreement that could then be reviewed by the federal agencies to determine if it's a viable solution to buoying the cratering river system that 40 million people rely upon for drinking water.

But if there is no consensus reached by then, the federal government says it is prepared to move forward with

a separate plan where o cials could impose mandates on the states in order to keep water levels at Mead and Powell from reaching points that would threaten water delivery and hydropower capabilities at Hoover and Glen Canyon dams.

Authority Optimistic

The water authority still hopes to work with the other basin states and water users to refine the proposals, said Colby Pellegrino, the authority's deputy general manager for resources.

"We still think the best path forward for this basin is for states and water users to get together and roll up our sleeves and over the next month really figure out what exactly this looks like," Pellegrino said. "I feel more optimistic than I have in awhile. The states always perform better when there's a clear deadline and a clear direction."

Under normal circumstances, Nevada receives roughly 300,000 acre-feet of water from the Colorado River annually, with the river supplying roughly 90 percent of Southern Nevada's water.

The water authority has been successful in implementing various water saving measures since the drought started more than two decades ago, reducing the region's water consumed by nearly 100,000 acre-feet annually while it added roughly 750,000 new residents.

Pellegrino said the authority has run into roadblocks getting other states to see the need to cut back on water use in recent years.

"Agreeing to use less water is very challenging for everyone on the river. I think everyone recognizes the problem, everyone recognizes the magnitude of the problem," she said. "I don't know if everyone agrees on the urgency of the problem."

Contact Colton Lochhead at clohhead@reviewjournal.com. Follow @ColtonLochhead on Twitter.

ENVIRONMENT

Water managers across drought-stricken West agree on one thing: 'This is going to be painful'

by Jeniffer Solis, Nevada Current

By Nevada Current | December 20, 2022

Water authorities in the Western U.S. don't have a crystal ball, but rapidly receding reservoirs uncovering sunken boats and other debris lost in their depths decades ago give a clear view of the hard choices ahead.

If western states do not agree on a plan to safeguard the Colorado River — the source of the region's vitality — there won't be enough water for anyone.

Water managers, researchers, agricultural producers and others from across the drought-stricken river basin met in Las Vegas last week for the Colorado River Water Users Association annual convention to face hard truths about the state of the river and historically-low levels of its biggest reservoirs.

Two decades of drought and poor planning have caused the river's biggest reservoirs — Lakes Mead and Powell — to drop to their lowest collective volume since they were filled.

"Time is not on our side. Hydrology is not on our side. That's the frightening reality," said Rebecca Mitchell, director of the Colorado Water Conservation Board. The hydrology "is going to force us to do something because we will have no other choices. Every day that passes this problem gets harder and harder to solve."

Water storage in Lakes Mead and Powell is at a fraction of what it was two decades ago, and could drop below what's needed to generate power as soon as next year, said water experts.

To put it in perspective, this winter both reservoirs were about a quarter full. In December 1999, Lake Powell was at 88% capacity, and Lake Mead was at 96% capacity, according to analysts.

Lower basin states faced their first-ever federally declared water shortage, which directs how much states can draw from the Colorado River in 2021. Deeper cuts were subsequently declared this year.

Water experts say more water cuts for lower basin states – including Nevada – are likely in 2024 due to even lower water levels.

Even further restricting water allocation "doesn't mean the lakes won't go lower than that," said Ted Cooke, the general manager for the Central Arizona Project.

If nothing is done, there is a real possibility water levels in both reservoirs will drop so low in the next two years that water will no longer flow downstream to the 40 million people in the West who rely on the Colorado River.

Faulty numbers and an over-allocated river

At the center of discussions last week was one of the most important legal documents governing how the river's waters are shared: the 1922 Colorado River Compact, which allocated 7.5 million acre-feet for each basin, based on a faulty model that assumed the river system could supply 15 million acre-feet annually.

Today, officials acknowledge only 12.4 million acre-feet flows from the river each year, meaning western states will have to agree on massive cuts to their water supply for the sake of the river — a politically perilous decision.

Despite clear evidence of diminishing water supplies over the past century, not much has changed in terms of how states allocate and use water.

But those in charge are starting to understand that western states are getting to a tipping point that will force them to adjust their attitudes and change their consumption habits.

In June, Bureau of Reclamation Commissioner Camille Touton issued an ultimatum to states: Develop a plan to save 2 million to 4 million acre-feet of water by next year — roughly one-fifth of the water currently allocated to states—or the federal government will step in.

During a panel discussion at last week's convention in Las Vegas, representatives for the seven western states who rely on the Colorado River said reaching a compromise will be their collective priority for the next six months.

They agree that the longer it takes to stabilize the river and conserve the water needed to keep the river functional, the more likely reservoir levels will continue to plummet, leaving states with fewer and fewer options.

Water managers also agree that about 75% of future water cuts will need to come from lower basin states — including Nevada — to reach reductions large enough to protect critical elevations in the reservoirs.

> "I'm a big believer in the law, I'm a big believer in food security, but I'm an even bigger believer in math." –
> **John Entsminger, Southern Nevada Water Authority**

Lower basin states — Nevada, Arizona, and California — use nearly all their 7.5 million acre-feet Colorado River allocation compared to the 4.5 million acres-feet used by the upper basin states, said water managers.

"Yes, the lower basin will have to take the lion's share of the reductions," said John Entsminger, the general manager of the Southern Nevada Water Authority. "I'm a big believer in the law, I'm a big believer in food security, but I'm an even bigger believer in math."

Nevada uses only a small share of the river's water and has made great strides in conservation, but Arizona and California are still far from a deal. Both states will need to make painful reductions and incur massive expenses to stabilize their water use, say water experts.

Just last week, all of Southern California was declared to be in a drought emergency by the Metropolitan Water District, the main water supplier for Los Angeles county.

Lower basin states argue that upper basin states — Colorado, Wyoming, Utah, and New Mexico — also need to make a firm commitment to lower their water use.

Officials for the U.S. Bureau of Reclamation warned that aridification, the long-term shift to a drier climate, means even less snow runoff is making it to the river each year.

"It's really hard to come up with solutions" based on who has priority water rights, said Tom Buschatzke, director of the Arizona Department of Water Resources. If cities in lower-basin states "wipe out every drop of their water, it's still not going to stabilize the system," said Buschatzke.

The upper basin has committed to looking into the feasibility of cutting back their water use — a move critics say amounts to "planning to make a plan."

Upper basin states have not released an estimate of how much water they are able or willing to cut. However, the Upper Colorado River Commission says they are slowly taking steps to create a management plan with potential water cuts.

"We live within the means of the river every day," said Becky Mitchell, the director of the Colorado Water Conservation Board. "What we like to do is under-promise and over-deliver, and make sure if there is a number out there it is a number that can actually be achieved."

Reservoirs in upper basin states are currently providing what amounts to 19% of their annual water usage to Lake Powell, based on a 2019 drought response agreement.

"Those releases have had significant impacts, huge impacts on the local communities," Mitchell said.
"What you're asking for is a big ask. We are willing to look at this, but we also need to look at the impacts at the same time."

Water managers representing the four upper basin states released details of a temporary conservation plan last week.

One critical component of the plan is the reauthorization of the System Conservation Pilot Program, a program that paid water users to reduce their use, with the goal of implementing it by the summer.

It's unclear how much water the pilot program will successfully conserve as a voluntary and temporary solution. The original program saved about 47,000 acre-feet of water at a cost of about $8.6 million over the four years.

"The System Conservation Pilot Program is called a pilot program for a reason," said Gene Shawcroft, general manager of the Central Utah Water Conservancy District. "We believe we will learn a lot from that. We believe that it can easily be transitioned into a management plan."

‘This is going to be painful’

Brandon Gebhart, the top water official in Wyoming, said previous conservation programs that depend on voluntary cuts were not as effective as water managers had hoped, but a recent shift in mentality among water users could make the difference.

Another change that could make the difference is the nearly $4 billion set aside for the Colorado River that would allow the Bureau of Reclamation to pay users to voluntarily forgo water use.

“There are positives. The funding that is coming in provides opportunity. It provides the ability to change,” said Mitchell, the director of the Colorado Water Conservation Board.

Still, water managers say the federal government will need to invest even more money into the river.

“If you look at the federal investment in Florida, after one hurricane they got an order of magnitude more federal assistance than the entire Colorado basin is getting in the face of this crisis,” said Entsminger, the Southern Nevada Water Authority general manager.

Western states will need all the assistance they can get to find ways to run their economies with less water, and time is running out.

> “We need to accept the situation we’re in and we need to reduce demands. All of us, every sector, every state, every water user. There isn’t any other way.”
> **– Becky Mitchell, Colorado Water Conservation Board**

A recent survey by the American Farm Bureau Federation found that more than 650 farmers in 15 Western states saw a 74% reduction in harvests, and 42% switched crops due to the drought.

It took Western states five years to agree on a short-term five year plan to address the region-wide drought that is set to expire in 2026, said Entsminger.

“We don’t have five months to come up with an operation plan for 2023,” Entsminger said. “It’s time to set aside the talking points and get real.”

Climate change has shrunk the river’s flows roughly 20% in the past two decades, and scientists predict they will shrink nearly 10% more with each additional degree of temperature rise.

“We have to move quickly and we’re committed to that,” said Mitchell. “We need to accept the situation we’re in and we need to reduce demands. All of us, every sector, every state, every water user. There isn’t any other way.”

“We have to accept that we can not cling to our entitlements or allocations. If they are not there none of it matters,” Mitchell continued. “Folks in the room have to be willing to let us make hard decisions, because this is going to be painful.”

Nevada Current

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NevadaToday

The Derby Dam sits on the Truckee River in Sparks, Nevada. (Photo courtesy of Manny Becera)

Nevada State Climatologist Steph McAfee provides some insight about our state of water

Nevada has been experiencing drought after drought

Nevada is the driest state in the United States. And once again, Nevada is in a drought.
"We're pretty good at handling drought in Nevada. We have a lot of practice," Steph McAfee said. McAfee is an associate professor in the Department of Geography and is the Nevada State Climatologist. "But we're probably going to be moving into a future where we need to get even better at dealing with it, where droughts are going to be more common and more severe."

Nevada has been in a drought since late 2019, and extensive droughts are happening with increasing frequency in Nevada and the impacts are compounding.

Warming temperatures caused by climate change and drought are contributing to reduced water availability as water is evaporated more quickly from rivers, lakes, soil and snow. The increased temperatures also extend the typical growing season for plants in Nevada. The extended growing season and higher temperatures means plants need more water for longer. Snow helps to reflect heat out of the Earth's atmosphere and holds water more efficiently than rain, but higher temperatures mean there will be more rain and less snow.

Science & Technology (https://www.unr.edu/nevada-today/news/science-technology) | **December 21, 2022**

Michelle Werdann (https://www.unr.edu/nevada-today/about/authors/michelle-werdann)

Steph McAfee serves as an associate professor in the Department of Geography and as the Nevada State Climatologist.

"If you live in Reno, a lot of your water comes from the Sierra Nevada," McAfee said "Your water is rainfall, it falls as snow. If you live in the more rural parts of the state, you're more likely to rely on groundwater." Groundwater might seem like a great place to pull from, but groundwater takes a lot longer to be replenished than reservoirs, sometimes thousands of years.

McAfee suggests that planning ahead is the best option for water conservation in the region.

"The time to think about and plan about drought is not when we're in one. We want to keep those planning ideas front and center. People can be generally water smart in Nevada to reduce water waste," McAfee said. "These are things that most Nevadans probably do anyway." The first thing she suggests is finding out what, if any, water restrictions people may be asked to follow, and following them. This might involve reaching out to a landlord for renters. Watering plants later in the evening or first thing in the morning when it's cooler and covering pools when they're not being used can help reduce water evaporation.

For more long-term options, people thinking about remodeling a bathroom can use water-smart fixtures. Buying low-water-use appliances when replacing washing machines or dishwashers can have a big impact, as does landscaping with native plants instead of lawns. Mulching holds more water in the soil, and so does shade protection.

McAfee points out that these small things not only save water but can help people save on water bills. "A lot of those little water saving things add up," she said. "This drought will end, but there will be another one. In between, that's a great time to be keeping in mind, 'How can I be better set up for the next drought?'"

This story was originally published in the 2022 'Live a Life of Discovery' magazine from the College of Science under the title, "Our state of water."

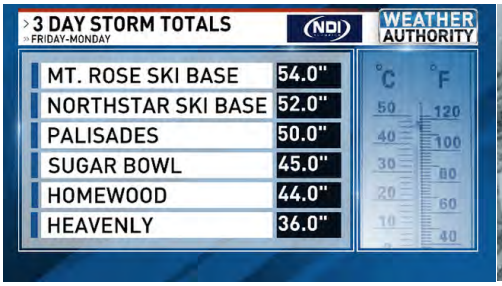
Science & Technology (https://www.unr.edu/nevada-today/news/science-technology) |December 21, 2022

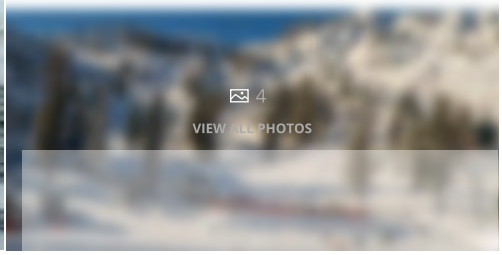
Michelle Werdann (https://www.unr.edu/nevada-today/about/authors/michelle-werdann)

Sierra snowpack one month ahead of schedule, drought concerns continue

by Madison Macay
Thursday, December 22nd 2022

Courtesy: Lisa H, Truckee





SOUTH LAKE TAHOE, Calif. (KRNV & KRXI) — The early December storm that slammed the Sierra from December 9 through December 12 not only shut down major roadways and ski operations, but broke significant snowpack records for this time of year.

The Eastern Sierra is currently 257% of median snowpack.

In terms of snow totals, this storm brought the Eastern Sierra four to five weeks ahead of the "normal" snowpack schedule.

> *We're about 2 and a half times the median snowpack*

said Tim Bardsley, a National Ocean and Atmospheric Association (NOAA) hydrologist.

What does this storm mean for drought, water supply and flood risk?

According to Bardsley, the current Eastern Sierra Snowpack (Tahoe, Truckee, Carson, and Walker) is 257% of median.

He emphasizes how persistent storms are needed in order to build the Sierra snowpack back to pre-drought levels.

To get Northern California and Nevada completely out of its' decades long drought, a major record-breaking storm would have to occur. However, this early December storm did produce record breaking statistics for Palisades Tahoe, in Olympic Valley, California.

In just 24 hours, Palisades got more than thirty-five inches of snow, making this early December storm the **6th largest in resort history.**

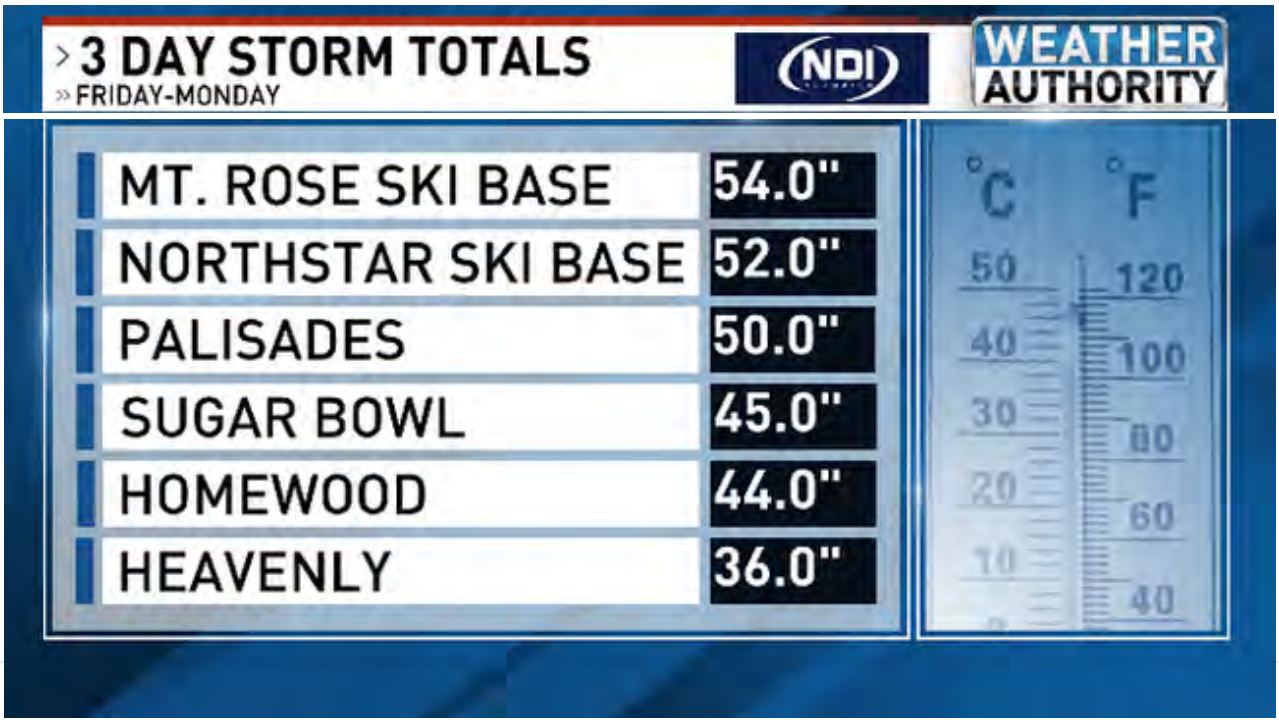
Bardsley tells News 4-Fox 11 that soil moisture under the snowpack is still below normal and will reduce into runoff efficiency (and mitigate flood risk).

The National Weather Service Reno says we aren't out of the woods quite yet in terms of flood risks though.

> *The current mid to low elevation snowpack increases our flood risk somewhat, but this is offset by low soil moisture and a cold snowpack. A warm wet event can act as a primer increasing flood risk*

explained Bardsley.

NWS Reno meteorologists explain how although there is no White Christmas in store of Reno-Tahoe for 2022, a more robust storm track is in sight for the New Year.



Nevada’s Conservation Year in Review

By **Russell Kuhlman** - December 27, 2022

A Dixie Valley toad in its wetland habitat. Dixie Valley toads are found only in a hot-spring fed wetland in Dixie Valley, northeast of Fallon, Nevada. Dixie Valley toads were emergency listed as an endangered species in April 2022. Primary threats include geothermal development, disease, predation by other non-native frog species, groundwater pumping for human and agricultural use and climate change. - image: courtesy of Wiki Commons

Commentary

As this year draws to a close, it is helpful to look back over the past 12 months to reflect on our successes and failures. Fortunately, within Nevada’s conservation world our victories far outweighed our setbacks. From passing the largest funding for climate action to prioritizing Nevada’s wildlife and habitat, our state’s “conservation needle” moved in the right direction.

In August, the most significant climate legislation in U.S. history was passed via the Inflation Reduction Act. This legislation designates $4 billion for drought resiliency in Western states, including Nevada, facing historic levels of long-term drought, with priority for the Colorado River Basin and inland water bodies like Lake Mead. This includes paying farmers, rural

districts, and others to not plant crops and let their fields go “wild.” This policy has the potential to also benefit wildlife while helping to fund the installation of efficient watering technology. The bill also sets aside $5 billion to support healthy, fire-resilient forests, forest conservation, and urban tree planting. Within that $5 billion, $1.8 billion specifically addresses the urgent need to reduce the threat of catastrophic wildfires and protect communities.

Lake Mead – image: Russell Kuhlman

Having a healthy forest ecosystem directly benefits Nevadans by providing clean water to drink and clean air to breathe– rights that should be given to all Nevadans and their communities. But it is also vital to the economic health of our state. Recovering from recurring climate-driven wildfires is expensive. Preventing wildfires saves money in the long run. Raging fires and dangerous air quality negatively impacts the tourism dollars that towns like Lake Tahoe rely on to survive. And it’s not just Tahoe. Nevada’s outdoor recreation industry statewide generates over $12 billion every year in consumer spending alone.

The Inflation Reduction Act also modernizes how we responsibly develop domestic energy production on our public lands. By updating the royalty rate, minimum bid requirements, rental rates, and ending noncompetitive leasing, the law will put taxpayers and our public lands first – not the oil and gas CEOs who made record-breaking profits in 2022.

Regarding wildlife victories, Nevada residents have plenty to celebrate about. In November, the Bureau of Land Management (BLM) announced an Instruction Memorandum calling for increased collaboration between BLM state offices and state wildlife departments to include habitat connectivity in future wildlife management. The best science available shows the

West, including Nevada, is losing 1.3 million acres of sagebrush habitat every year. The continuing fragmentation and disconnection of habitat is resulting in increasingly isolated animal populations that has led to the inability for wildlife to reach important winter and summer habitat. This new guidance will ensure that wildlife connectivity is an integral part of the BLM's wildlife management process.

Wildfire smoke – image: Russell Kuhlman

In addition to protecting wildlife corridors, the Dixie Valley Toad, Tiehm's buckwheat and Whitebark pine were all given the protections afforded through the Endangered Species Act.

While adding species to the endangered species list has both positives and negatives, there is legislation in Congress that would save many species from joining that list. The bipartisan Recovering America's Wildlife Act (RAWA) is legislation that would give state wildlife agencies the funding and resources to help species recover, thrive and avoid the heavy red tape that typically accompanies an endangered species listing. Unfortunately, RAWA failed to be approved in the 117th Congress, but hopes are high that this historic wildlife bill will find passage in 2023.

As Nevada's conservation community looks back on 2022 with a sense of accomplishment, there is still work to be done. Through dedication and hard work, next year will provide the opportunities to advance Nevada's conservation goals of protecting, conserving and restoring our native landscapes and wildlife.

Russell Kuhlman, Executive Director – Nevada Wildlife Federation

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The Nevada Wildlife Federation. An organization dedicated to Nevada's conservation efforts.

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The Sierra Nevada Ally has been selected to receive $15,000 in matching funds from NewsMatch 2022 for our dedication to serving our residents with local news about issues that impact their lives and support civic engagement.

NewsMatch 2022 is a fundraising initiative sponsored by The Institute for Nonprofit News (INN). We are a full member of INN, one of only two such publishers in Nevada. Between November 1, 2022, and December 31, 2022, your gift will be doubly matched since

The Loud Hound Partner Fund also awarded us matching funds to cover important civic, environmental, cultural, and political issues that impact our citizens' lives.

Join us and triple your support of the Sierra Nevada with a gift today for up to $1,000 per gift.

On behalf of all of us at the Sierra Nevada Ally, thank you for your generous support.

The NEVADA INDEPENDENT
YOUR STATE. YOUR NEWS. YOUR VOICE.

Fly fishing on the Truckee River. (David Calvert/The Nevada Independent)

Indy Environment: Four Nevada environmental issues to watch in 2023

Good morning, and welcome to (a holiday edition) of the Indy Environment newsletter. Hope you are having a wonderful holiday, and I hope this is the start of a healthy and happy new year!

As always, we want to hear from readers. Let us know what you're seeing on the ground and how policies are affecting you. Email me with any tips at daniel@thenvindy.com.

If you received this from a friend, sign-up here to receive it in your inbox.

The water year and the drought: The start to the water year began strong, with near or above average snowpack across most of the state. At this point, it is hard to predict what the rest of the year will look like. But nearly all of Nevada — along with much of the West — remains in some degree of prolonged drought, a deficit created by several back-to-ack years of arid conditions.

Some of these conditions are visible. To put a couple of numbers on it: As of Dec. 1, Lahontan Reservoir was at 7 percent of capacity. Near Fallon, the reservoir captures flows off the Carson River and diverted flows off of the Truckee River. Rye Patch Reservoir, located on the Humboldt River outside the town of Lovelock, sat at 4 percent of capacity. Combined reservoir storage on the Walker River was at about 22 percent. And Lake Mead?More on that in a later section.

Precipitation is only one part of the equation. There are a number of variables that go into how snowpack melts and runs off into streams and rivers. If soils are drier, for instance, the runoff in the spring might be less efficient, affecting the amount of water that makes it into any given river.

In many places, the drought places further strain on an already strained system. In some cases, there are more rights than there is water to go around. Add to that pressures from more growth.

It will be worth watching how policymakers in Nevada factor the drought into decision-making, especially with a new legislative session beginning next year. How will water be incorporated into economic development decisions? Into funding for water agencies? How will policymakers weigh environmental concerns? Commitments that the state made to water users in the past?

One factoid that Justice James Hardesty cited when I interviewed him last month stands out to me: "Without question, the highest number of Supreme Court decisions on [water law] have existed within the last decade as compared to all of the decades preceding 2010 …"

A rush to build in an energy transition: Lithium mining. Geothermal plants. Solar fields. They are all components of a national and global economy that is moving away from fossil fuels and transitioning toward renewable power for electricity and transportation. And major corporations are looking to develop in the Great Basin, which is rich in lithium deposits, geothermal potential and year-round sun. But in many cases, much of the public land where these projects might go is accounted for in some way, managed by the federal government to serve multiple uses.

Every week, my inbox is filled with press announcements about new projects or those already in the pipeline. A few from just the past month: Chevron formed a joint venture seeking geothermal in Esmeralda County. The Biden administration announced plans to ramp up solar development on public land. Ioneer, at the center of a controversy of a rare endangered buckwheat, is starting its permitting process. Next month, a judge will hear a case brought by environmental groups, a rancher and Indigenous communities challenging permits for a lithium mine at Thacker Pass.

Exactly where such projects go — and the speed at which they move forward under political and economic pressure — is an issue worth watching in 2023. Expect to see lobbying at all levels.

A big question is how federal land managers weigh these proposals. The federal government oversees about 85 percent of Nevada's land and will accordingly lead the permitting for many of these projects — some of which disrupt ecosystems, migratory corridors and stress water resources. These issues are nuanced, in many cases (see Clayton Valley and lithium).

How these issues are considered in project permitting — and whether a government-wide plan is created to deal with an influx of new projects in the Great Basin — will be important to watch.

Gov.-elect Joe Lombardo speaks at a Stronger Nevada PAC event on Nov. 8, 2022. (Daniel Clark/The Nevada Independent)

Negotiations on the Colorado River: The Colorado River, which is the source of nearly all of the Las Vegas Valley's drinking water, is so complicated and consequential it deserves its own category here.

The watershed continues to face a serious shortage, with extremely low amounts of water stored at Lake Mead and Lake Powell, the nation's two largest reservoirs. Together, the Colorado River serves 40 million people. The watershed spans seven Western states, 30 tribal nations and Mexico. And despite pleas from federal officials throughout 2022, water users have failed to come up with a consensus agreement about how to cut what they take out of the river.

One way or another, though, the cuts are coming next year.

Earlier this year, the federal government initiated a formal planning process to reconfigure how the U.S. Bureau of Reclamation will operate the reservoirs in emergency conditions in coming years. The actions being contemplated would involve reductions in water use
— and they would likely have a sizable impact on the states that are downstream of Lake Mead, largely Arizona and California. The two Southwest states account for the biggest downstream uses of the river.

At a recent conference, the federal government indicated that the preferable path forward would be some sort of consensus plan, agreed upon and negotiated by the seven states. It's possible that the states will get to an agreement by an early 2023 deadline. Either way, though, cuts are going to have to be made in 2023. And they are likely going to be painful for water users in the basin. The crisis, despite its echoes to water issues elsewhere, is on a different size and scope.

Everything feels larger on the Colorado River.

A point made earlier this year by the Audubon Society's Colorado River program director, Jennifer Pitt, stuck with me. Who gets left out when water users on the Colorado River are living on the "razor's edge?" Whose concerns are not taken into consideration? And will it cause water users to repeat mistakes of the past? A few (of many) questions to think about going into 2023.

A new administration in Carson City: Next week, Gov.-elect Joe Lombardo will become Gov. Lombardo, taking the helm of state government. When it comes to environmental issues, a lot of focus goes to the federal government, given its significant role managing public land in Nevada and enforcing laws like the Endangered Species Act and the National Environmental Policy Act.

But the state executive branch plays a sweeping role in setting and executing policies when it comes to everything from energy to wildlife, water to mine permitting. In addition, the governor can influence policy results through appointments to state boards and regulatory commissions.

In his campaign, Lombardo, a Republican, focused on two issues: water and wildfires. But it's likely that his priorities will become more apparent with the introduction of a proposed budget and his State of the State address heading into the legislative session — not to mention his appointments.

A big question is how Lombardo approaches climate change in his policymaking. What does a Lombardo administration mean for the state's climate strategy, an expansive plan that details the state's path to net-zero emissions by 2050? What about the strategy's stated goal calling to eventually transition away from natural gas? One clue might be in Lombardo's appointment of a Southwest Gas official to his transition team (the utility had expressed concerns about the plan).

At the same time, many of the state's climate goals are set by statute, including a renewable portfolio standard for utilities of 50 percent by 2030. And there is some money on the table— the federal government set aside funding for climate programs in the Inflation Reduction Act.

As the administration comes into office, it will be important to watch the new governor's budget for energy and environmental programs and, of course, how the administration interacts with a Democrat-controlled Legislature in a state with a significant solar and geothermal industry.

FEATURED NEWS GOVERNMENT

Sparks' Dahir to take medical leave

By: **ThisIsReno** December 28, 2022

Kristopher Dahir

Sparks City Council member Kristopher Dahir this week said he'd been diagnosed with a benign brain tumor. He plans to undergo surgery within the next several months and will take time off to recover.

"I will be taking some time off my City duties to focus on my recovery," Dahir said. "I am so thankful for this community and appreciate all the thoughts, prayers, and support."

Dahir said he is positive about his prognosis and will resume his council duties once recovered.

While Dahir is out other Sparks council members and Mayor Ed Lawson will split up and cover Dahir's duties on local boards and commissions and on the council.

Source: City of Sparks

Water "bank account" running low in agricultural areas of Nevada

Photo credit: Kurtiss Schmidt/USGS

29/12/2022

In a new report published, U.S. Geological Survey scientists determined that groundwater in the Smith and Mason Valleys, a key agricultural region in Nevada, is **being used up by humans at rates faster than it can be replenished.**

The report documents water-level changes between 1970 and 2020, estimating groundwater storage-volume declines of 287,600 acre-feet in Smith Valley and 269,000 acre-feet in Mason Valley. The study also demonstrates that even during wet years, **the Walker River is not able to adequately recharge the groundwater supply**.

“Looking at groundwater, streamflow, and climate data from over half a century, it is clear that we are running into a water deficit,” said Gwendolyn Davies, USGS hydrologist and lead author of the report. “Groundwater is like a bank account, and when you take more out than you are putting in, at some point the account runs dry.”

In the report, valley-wide water-level change was calculated by comparing water-table maps for the periods 1970-1995, 1996-2006, and 2007-2020; as

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We provide science about the natural hazards that threaten lives and livelihoods; the water, energy, minerals, and other natural resources we rely on; the health of our ecosystems and environment; and the impacts of climate and land-use change.

well as the overall change from 1970-2020. **Trends in water-level change corresponded with patterns in groundwater pumping and stream efficiency.**

The introduction of supplemental groundwater pumpage in the 1950's was initially intended to offset surface water deficits only during dry years, but pumpage continues even in years when average or above average stream flows meet surface water demands. Reliance on supplemental groundwater pumpage has resulted in widespread groundwater storage decline and decreased stream efficiency. With each successive drought cycle, the ability of Walker River to sustain stream flows and convey water downstream has diminished.

"This report will provide essential information to communicate recent status and trends in water resources in Smith Valley and Mason Valley, and to help the local water users move forward on developing a long-term plan for sustainable water use." said Adam Sullivan, the State Engineer with the Nevada Division of Water Resources.

Above average wet periods have a marginal and short-lived effect on rebounding the groundwater levels outside of the river corridor.

The Walker River originates in the Sierra Nevada Mountains and flows nearly 160 miles to its terminus at Walker Lake in west-central Nevada. The river provides a source of irrigation water for tens of thousands of acres of agricultural lands in California and Nevada and is the principal source of inflow to Walker Lake.

Tahoe Daily Tribune action

Snow study: Researchers examine factors impacting Sierra Nevada snowpack

News FOLLOW NEWS | Dec 30, 2022

Claire McArthur / Tahoe Daily Tribune

The Sierra Nevada snowpack is a "water tower" for much of California and Nevada.

Provided/Claire McArthur

Eight of the top 10 warmest years on record occurred in the last decade. The snowline where rain turns to powder continues to move uphill. The dry season is longer than ever as wildfires ravage forests and communities. It's a bleak outlook for the state of the Sierra Nevada snowpack, not to mention our planet as a whole.

But for scientists in California and Nevada, it's about digging in and uncovering the unknowns of the climate change crisis impacting the mountains that are responsible for a third of the Golden State's water and, in conjunction with the Rocky Mountains-fed Colorado River, 85% of the Silver State's supply. In knowledge, they say, there is hope.

RAINY WINTERS

For over 75 years, the Central Sierra Snow Laboratory, perched 7,000 feet atop Donner Pass, has been studying the Sierra Nevada snowpack. Established in 1946 by the U.S. Weather Bureau and Army Corps of Engineers, snow scientists have been manning the station collecting data on precipitation, snowfall, snow depth and air temperature ever since.

The current scientist responsible for the 2-acre property with instrumentation measuring wind speed, solar radiation, snow temperature and relative humidity, to name a few metrics, is Dr. Andrew Schwartz. Though the technology has progressed, Schwartz still treks out after each storm to take core samples just as his predecessors would have since the lab's inception.

"There's always going to be planet and climate variability. There's always going to be cyclical trends, especially with things like El Niño and La Niña that switch on the order every three to four years and do affect our weather a little bit. With that being said, we are seeing broader trends for sure," says Schwartz.

Most notably, says Schwartz, is that more precipitation is falling as rain instead of snow. October and May have already changed from being predominantly snow months to rain months, and November and April are following that trend.

"The snowpack that we have is very beneficial because it is another means of storage, another reservoir or water tower on top of the mountain, that affords us the luxury of storage without needing any additional infrastructure," notes Schwartz. "It really helps to have it in that frozen snow form rather than rain because it slowly trickles down in our streams. It allows for summer and fall usage in deep years."

At the snow lab, and across California and Nevada, scientists are working to better understand the factors that lead to earlier and faster snowmelt in the Sierra, including rain on snow events that can lead to rapid melting and flash flooding down the Truckee River.

Scientists are studying a range of factors impacting the snowpack melt in the Sierra, from watermelon snow to wildfires.
Provided/Desert Research Institute

"We've had instances when there has been massive flash flooding in Reno after these types of rain on snow events because it can melt the snowpack very, very quickly," explains Schwartz. "With the increase of rain in the winter months, these events are going to become more frequent so we really want to understand how rain affects the snowpack and why sometimes we get these massive flooding events and other times we don't."

WARMING HABITATS

Dwindling snowpack is taking its toll on the ecosystems of the Sierra Nevada that have evolved to survive with the same amount of snow year after year. Between 2002 and 2011, the snowpack in the Sierra was 100% or more of the historic average for six winter seasons. But in the last decade, it has only reached that marker twice.

Like a canary in the coal mine, the American pika has disappeared from a 165-square-mile area of habitat in North Lake Tahoe, the largest pika die-off in the modern age. Warmer temperatures and a declining snowpack are to blame, according to a 2017 study.

A relative of the rabbit, the rodent-like mammal has adapted to survive in cold, snowy winters during which, unlike other high-elevation species such as the marmot, it does not hiberature. With a thick coat of fur and a furnace-like metabolic rate, the pika are vulnerable to overheating in warm weather.

The research team behind the study, led by biologist Joseph Stewart, searched for six years in the former habitat surrounding Mt. Pluto, finding old scat but no pikas. They believe the pika population died from hyperthermia or did not collect enough food due to the warmer temperatures and ended up starving or not reproducing.

Other studies have documented the disappearance of pika from the Black Rock Range in Nevada and Zion National Park in Utah.

By 2050, Stewart predicts that 97 percent of the habitat suitable for pikas in Lake Tahoe will become too warm for the rodents.

"It's indicative of a very worrying trend. If we don't reign in global warming pollution, about a million species or 15% of species on earth are vulnerable to extinction from climate change," said Stewart at the time of the study's publication. "I think the pika can be an ambassador species for species that are vulnerable to climate change."

The snowline, where rain turns to snow, continues to move uphill in the Sierra Nevada.
Provided/Claire McArthur

STRESSED FORESTS

The forests of the Sierra Nevada are feeling the strain of a disappearing snowpack, too.

“This is not just happening in the Sierra Nevada, but places all over the west,” says Dr. Anne Nolin, a professor in the Geography Department at the University of Nevada, Reno, with three decades of experience researching snow hydrology, climate change and mountain ecosystems. “As snowpacks continue to decline and the summer dry season now extends into November, we see that the forests are really moisture-stressed and that makes them vulnerable to a lot of things like insect infestations and, of course, fire.”

Using satellite images from NASA, Nolin has documented the “browning of forests” in areas where snow has disappeared.

A dwindling snowpack is affecting the health of the trees in the Sierra Nevada.
Provided/Claire McArthur

“When the snow is all melted from a certain pixel on the satellite image, you can really see the statistically significant relationship between that and the forests in those locations becoming browner over the last 25 years. Those are also places where we see the fires happening,“ explains Nolin.

These fires are bigger, more severe and burning into watersheds and seasonal snow zones, which is a new development. Case in point: The Caldor Fire in 2021, which burned its way up the Western Slope, cresting Echo Summit and entering the Tahoe Basin, leaving 221,835 acres scorched in its wake.

In the burn scar of Caldor Fire, as well as previously torched forests around the west, Nolin and other scientists are studying the impact of wildfires on snow. The loss of the tree canopy exposes the snow to more sunlight. The snow, which usually reflects the sunlight, absorbs more of the solar radiation due to the black carbon falling from the charred trees. And as a result, the snowpack melts earlier and faster in these areas.

“There’s a significant impact after the fire and that goes on for years,” says Nolin.

The early melt-off is exacerbated by longer dry spells during the winter, which historically used to last 4-5 days but now stretch on for weeks.

“We’re seeing mid-winter melt happening in places we wouldn’t expect it and at times when we wouldn’t expect it. The more winters we have with dry spells, the more the snowpack is going to melt earlier and disappear faster,” adds Nolin.

CITIZEN SCIENCE

Though the escalating climate crisis — and its impacts reaching far beyond the dwindling Sierra Nevada snowpack — feels overwhelming, the average citizen can make a difference.

“One way that we can see hope is we can try to affect change through collective action. I always tell people that it’s good to do what you can do individually but you can only change so many lightbulbs,” says Nolin. “Collective action as it affects policy on a larger scale really does affect positive change when it comes to identifying strategies to reduce the impacts of climate change.”

Supporting research projects that seek to better understand the changing environment in a warming world is another actionable way to support the planet.

Last winter, an ongoing citizen science project examining pink algae blooms on snow branched out from the Cascade Range to the Sierra Nevada. The Living Snow Project studies the biodiversity of the algae that causes patches of snow to turn shades of red or pink, often referred to as watermelon snow, in an effort to understand its impact on snowmelt dynamics.

“When the algae grows on snow, it darkens the snow surface, which increases the amount of solar radiation that’s absorbed and increases the rate of snowmelt,” explains Dr. Robin Kodner, an associate professor at Western Washington University where the project originated. “As we get concerned about rapid loss of snowpack, we may be seeing increases in snow algae blooms, which are this added threat to snowpack melt and glacier melt as we see the climate warm.”

Through The Living Snow Project’s smartphone app, people out skiing or snowshoeing can document the algae blooms they come across in their excursions by inputting its size, color and location. Kits to collect samples of the snow are also available for people at Alpenglow Sports in Tahoe City, Tahoe Mountain Sports in Truckee and Patagonia Downtown Outlet in Reno. The samples are mailed back to Washington for processing where the researchers hope to better understand how the algae is dispersed, among other questions.

“When we sequence the DNA, it lets us know what algae species are present, which algae species coexist, and what other organisms are living with the algae,” says Kodner. “Do we see blooms at the same time each year? How long-lived are these blooms? Do we see them in the same places? A lot of this data that we get from observations from volunteers can help us address some of those questions in addition to the other work that we’re doing in our labs.”

Though watermelon snow is not an urgent concern in the Sierra Nevada like it is for the rapidly-melting glaciers in Greenland, it could be in the future as the snowpack melts faster and earlier than ever.

“We are hoping for at least 10 years of data in order to see the signal through the noise,” says Kodner. “The environment is changing so rapidly, so even when we look back 5 years ago, some of the changes we’re seeing year to year are even more extreme now.”

Editor’s note: This article appears in the 2022-23 winter edition of Tahoe Magazine.

LOCAL NEWS

70-foot drop at Lake Mead among urgent concerns in 2023 on Colorado River

FILE – In this July 28, 2014, file photo, lightning strikes over Lake Mead near Hoover Dam that impounds Colorado River water at the Lake Mead National…
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Nevada water officials target Upper Basin states to save Colorado River water

by: Greg Haas
Posted: Dec 30, 2022 / 04:06 PM PST
Updated: Dec 31, 2022 / 04:01 PM PST

SHARE

LAS VEGAS (KLAS) — Will 2022 be remembered as the year the West woke up to the realities of the historic drought affecting the Colorado River?

One thing's for sure: the alarm clock is going off, and it's time to get moving.

That sense of urgency has grown in Nevada, where water officials have forwarded a framework seeking big water use cuts for Colorado, Utah, Wyoming and New Mexico — the "Upper Basin states" of the Colorado River Basin. The states would be responsible for saving 500,000 acre-feet of water each year.

The Southern Nevada Water Authority (SNWA), led by John Entsminger, released the plan on Dec. 20 in partnership with the Colorado River Commission of Nevada (CRCNV). It wasn't received with open arms.

Gene Shawcroft, Utah's Colorado River commissioner, told the Salt Lake Tribune, "I like the fact that Nevada threw something on the table, because that gives us a point to talk to them about and explain again how the Upper Basin works."

Hoover Dam, shown in an aerial view of the Nevada-Arizona state line. (Duncan Phenix / 8NewsNow)

But it's more than a conversation starter. The framework takes a hard look at the agreements that govern the distribution of precious river water.

"There is simply far less water for use in the Colorado River Basin than has been allocated," the document says.

How we got here

Staring a "megadrought" straight in the eyes for a year after the federal government's official declaration of a water shortage in August of 2021. No one blinked as Tier 1 restrictions went into place. The slow wheels of government began to move in 2022 as the U.S. Bureau of Reclamation rejected plans put forward by the states that rely on the river for water — an essential supply of drinking water that also fuels industry and agriculture which are critical to the region. Reclamation announced it would act after states failed to reach a plan to save 2 million to 4 million acre-feet.

Nevada goes into 2023 under Tier 2 restrictions that will reduce its allocation from the river by 8% — which hasn't caused a major concern because conservation efforts have been so successful.

Nevada's share of the Colorado River drops to 275,000 acre-feet per year under the Tier 2 cuts. The state used only 242,000 acre-feet in 2021, and is on pace to use about the same in 2022. An acre-foot is about 326,000 gallons.

And while we proceed through the tiers with more restrictions to come, the stark realities of where we are headed are laid out plainly in the document.

river to a breaking point," the SNWA/CRCNV plan says. The Colorado River Basin may continue to warm by 2.5 degrees to 5 degrees by the middle of this century, and each degree of warming represents approximately a 5% decrease in runoff.

River flows at Lee's Ferry, just below Glen Canyon Dam at Lake Powell, have dropped significantly over the past two decades. Measured at 15.07 million acre-feet in 2007, the "average annual natural flow" was approximately 12.19 million acre-feet from 2000 to 2022.

Water flows from the No. 1 and No. 2 jet tubes as seen from atop the Glen Canyon Dam, March 5, 2008, in Page, Ariz. (AP Photo/Matt York, File)

Awareness of the drought in Las Vegas has risen as the level of Lake Mead has fallen. The "bathtub ring" shows how high the water reached before the largest reservoir in the country started to drop.

Currently, the lake is at 1,044.7 feet — a measurement of the altitude of the lake's surface compared to sea level. That's about 175 feet lower than it was in 1999, just before the drought began.

"Levels at Mead and Powell have basically stabilized since August as a result of extraordinary operations at other reservoirs — like Flaming Gorge and Blue Mesa," according to Kyle Roerink, executive director of the conservation group the Great Basin Water Network. "Without those other systems propping things up, we would likely be in a much more difficult management situation with less wiggle room."

Roerink said Friday federal forecasts are not promising.

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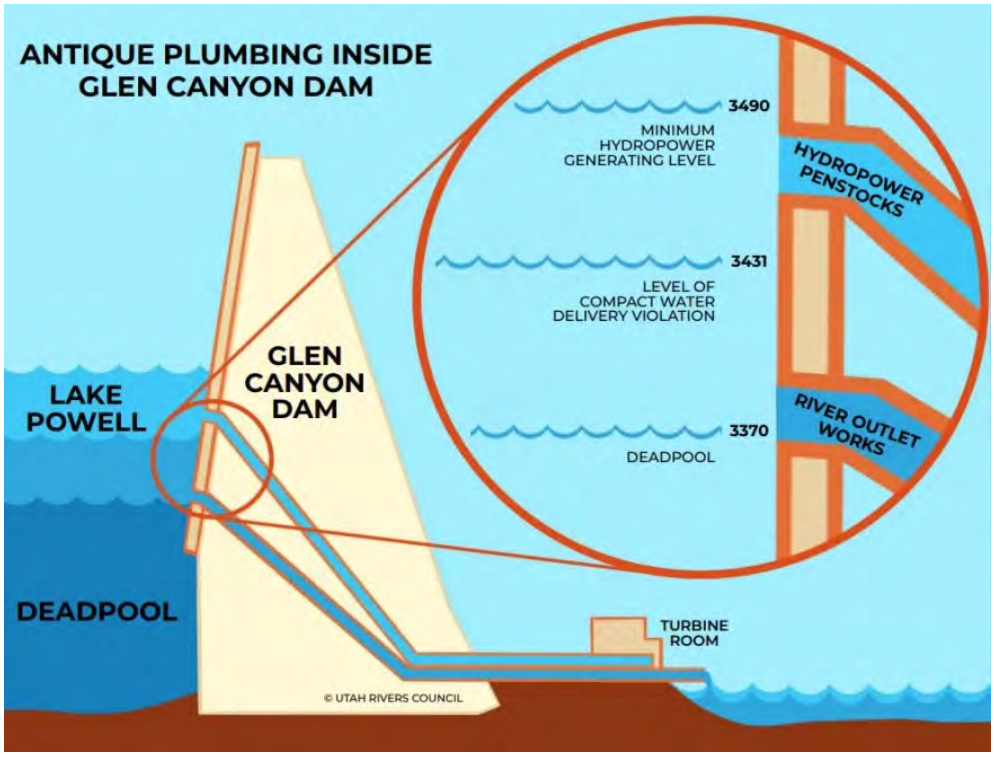
“It is well past time to prohibit the inefficient delivery, application, or use of water within all sectors and by all users,” the document says. “There simply is no water in the Colorado River System left to waste and each industrial, municipal, and agricultural user should be held to the highest industry standards in handling, using, and disposing of water.”



A graphic produced by the Utah Rivers Council shows critical elevations at Lake Powell and Glen Canyon Dam. Conservationists criticized the dam for its “antique plumbing.”

To that end, SNWA and CRCNV propose further reductions of water use in the Upper Basin states if Lake Powell drops to 3,550 feet — 10 feet above the level that’s necessary to continue power generation at Glen Canyon Dam.

The plan essentially draws a line. If the federal government wants power from Glen Canyon Dam, the water has to come from savings upstream — not from cuts to water that would normally flow downstream to Lake Mead for use by Arizona, Nevada and California.

Why should anyone listen?

SNWA speaks with authority in saying goals are reachable. The agency has been the voice of conservation efforts in Southern Nevada that have produced enormous water savings.

“By investing in conservation programs and anticipating future water-supply problems, Nevada has reduced its consumptive use by almost 100,000 acre-feet per year over the last 20 years, despite adding approximately 750,000 people,” SNWA says in the document.

The agency has been in the lead offering incentives for homeowners and businesses to remove “ornamental” turf grass that consumes water that cannot be reused. Restrictions on water use by golf courses is among the next steps that are in place.

But each of the states that were supposed to work together to meet Reclamation’s goal of saving up to 4 million acre-feet of water had their own success stories leading up to August. Bureau of Reclamation Commissioner Camille Calimlim Touton — a UNLV graduate — rejected states’ proposals when the deadline arrived, saying they were not of “sufficient magnitude” to achieve savings of 15-30% of water usage.

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An aerial view of Hoover Dam. (Duncan Phenix / 8NewsNow)

“For every 25 feet further decline in elevation at Lake Mead, it is estimated that approximately 250,000 MWh of energy and 125 MW of capacity will be lost at Hoover Dam. This is in addition to the approximately 2.3 million MWh of energy that Hoover contractors have lost since the start of the drought,” according to the plan.

Nevada officials worked behind the scenes with colleagues in Arizona and California to continue to hammer out agreements, and the Dec. 20 plan was the first public attempt to offer a comprehensive plan extending beyond commitments by any one state. The plan was submitted to the Department of the Interior in support of the government’s efforts to update a 2007 study with a Supplemental Environmental Impact Statement.

In the end, the Department of the Interior will have to decide whether Nevada’s plan has merit. Interior is expected to move forward in some way in January.

SATURDAY: *Evaporation, power and priorities in the Nevada water plan*

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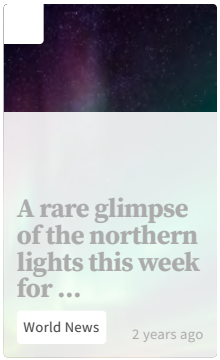

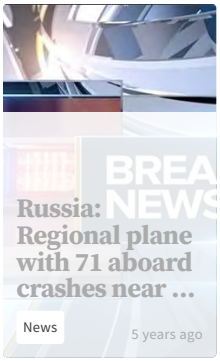

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AP

DRI Leading $5 Million Regional Climate Adaptation Project

Desert Research Institute - (GLOBE NEWSWIRE)
Jan 4, 2023

Reno, Nevada, Jan. 04, 2023 (GLOBE NEWSWIRE) -- The impacts of climate change have been acute in California and Nevada, with most of the last two decades spent in extended drought conditions and 2021 wildfires producing Reno's worst recorded air quality in the 21st century. Adapting to these challenges will require not only focused research to better predict climatic events, but will also depend on empowering local communities to use this knowledge to make informed decisions in the face of adversity. With $5 million in funding from NOAA's Climate Adaptation Partners initiative, the California Nevada Adaptation Program (CNAP) will spend the next five years bringing together researchers, community members, and practitioners to cooperatively conduct research and identify solutions.

For the first time, CNAP will be hosted in Nevada under the leadership of DRI's Tamara Wall, Ph.D., research professor of atmospheric science and deputy director of the Western Regional Climate Center (WRCC). DRI's long-standing partnership with Scripps Institution of Oceanography at the University of California San Diego will continue, with Dan Cayan, Ph.D., regional climate researcher and CNAP lead since its founding in 1999, and Julie Kalansky, Ph.D., who has served as CNAP program manager for six years, joining Wall to lead the project.

"The goal of CNAP has always been to expand more fully across the California and Nevada region," Wall says. "This is the first time that DRI is leading CNAP, and it's also the first time that CNAP is a system-wide effort. Bringing on partners from UNLV and UNR is important for meeting that goal and will help us address climate change impacts across the state."

California and Nevada have partnered for the CNAP program since 2011, producing research and results that include: the first Nevada Climate Assessment; California's Fourth Climate Change Assessment; recommendations for updating red flag warnings and the fire weather watch system; and analyses of water use and supply in California's agricultural communities.

The next five years will focus on adaptation, with an intentional transition from statewide climate research toward preparing communities for local-level action to address regional climate hazards. Six projects will support adaptation needs to address four of the most pressing climate issues in the region: extreme heat, wildfire smoke, coastal flooding, and water scarcity.

As part of the project's commitment to equity and diversity, it will include a mentorship program within community colleges to prepare the future's workforce to address climate impacts. In addition, a small grants program, Building Capacity through Reciprocity with Tribal Communities, will work to enact community-identified solutions for tribal communities by supporting a Leaders Indigenous Climate Fellowship Program.

"Centering CNAP's research on adaptation allows us to focus on producing community-centered solutions," Wall says. "Impacts from climate change are expected to amplify in the coming decades, and disadvantaged communities are the least able to manage those impacts without additional support. Our research includes community partners so that we can adequately understand community needs and concerns and improve people's lives."

Research Focus Areas

Extreme Heat

Highlights for planned research include creating the Southern Nevada Heat Resilience Lab (SNHRL), a regionally focused program that will bring together public service providers, including emergency responders and social services workers, with scientific experts on extreme heat. Real-time air temperature sensors will be installed in at-risk neighborhoods within Las Vegas, targeting locations such as public transit stops and buses, cooling centers, places with outdoor laborers, and unhoused communities. Following a trial period in Las Vegas, the project aims to expand local heat sensor networks to rural and Indigenous communities, where heat impacts are less well studied and understood.

Water Resiliency

In order to help California prepare a more resilient workforce in the face of growing issues with water availability, CNAP will partner with community colleges in the San Joaquin Valley to create climate-related workforce training opportunities. The goal is to create a more climate-technical workforce to support community adaptation to changes in water availability and climate extremes.

Coastal Erosion

Southern California is lined with some of the most heavily used beaches on the West coast, and this region is likely to experience increased flooding and erosion due to sea-level rise. CNAP will partner with collaborators to explore nature-based solutions and Indigenous stewardship as coastal adaptation strategies.

Public Health in the Face of Extreme Heat and Wildfire Smoke

California and Northern Nevada are increasingly experiencing extreme weather conditions with overlapping heat waves and intense wildfires. CNAP will explore the public health impacts of these events by directly assessing a sample of households in Washoe County, Nevada. Research will include installing air sensors to monitor heat exposure and air pollution, conducting interviews to understand decision-making under environmentally challenging conditions, and baseline health monitoring.

Understanding Burnout in Climate Change Professionals

Previous CNAP research has shown that climate change professionals are experiencing high rates of burnout, and institutional support isn't yet providing adequate resources to this population. CNAP will continue this line of study by evaluating the traits and communities that lead to more psychological resiliency and developing training materials based on the results for the CNAP team and partner networks.

State Climate Assessments

Both California and Nevada will likely produce new statewide climate assessments within the next five years, and CNAP will continue to coordinate among state and local efforts. CNAP will also pilot a mentoring program focused on early career faculty at universities and colleges in California and Nevada.

"NOAA Climate Adaptation Partnerships (CAP, formerly Regional Integrated Sciences and Assessments, or 'RISA') advances equitable adaptation through sustained regional research and community engagement," says Caitlin Simpson, program manager, NOAA Climate Adaptation Partnerships. "Climate affects every part of society, and this is most visible to us when we see long-term changes in social and environmental conditions, increased unpredictability, and extreme weather events. We seek to help people plan for and adjust to a changing climate by supporting long-lasting partnerships among scientists, decision makers, and communities. The result is a shared understanding about society's needs and the co-generation of credible and actionable knowledge to support community solutions. We work within regions composed of multiple U.S. state/territory jurisdictions which share similar climates and cultures."

“CNAP’s long history in the CAP/RISA program dates from 1997, and features many accomplishments, including substantial scientific contributions to all five of California’s climate assessments in close partnership with the state government,” continued Simpson. “CNAP has achieved deep expertise on sea level rise, drought, water resources, and wildfire planning issues and has closely partnered with a number of federal and nonfederal partners to advance local, state, and regional planning around these issues. The NOAA Climate Program Office is thrilled to fund the California-Nevada Climate Applications Program (CNAP) team for another five years as a part of the CAP/RISA Network.”

More information:

For additional information about CNAP visit: https://www.dri.edu/cnap/

CNAP Principal Investigators include Tamara Wall (DRI), Julie Kalansky (Scripps), and Daniel Cayan (Scripps).

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About DRI

The Desert Research Institute (DRI) is a recognized world leader in basic and applied environmental research. Committed to scientific excellence and integrity, DRI faculty, students who work alongside them, and staff have developed scientific knowledge and innovative technologies in research projects around the globe. Since 1959, DRI’s research has advanced scientific knowledge on topics ranging from humans’ impact on the environment to the environment’s impact on humans. DRI’s impactful science and inspiring solutions support Nevada’s diverse economy, provide science-based educational opportunities, and inform policymakers, business leaders, and community members. With campuses in Las Vegas and Reno, DRI serves as the non-profit research arm of the Nevada System of Higher Education. For more information, please visit www.dri.edu.

Elyse DeFranco Desert Research Institute (775) 673-7336 elyse.defranco@dri.edu

The NEVADA INDEPENDENT

Expected rain arrived as snow and damaged the grid. Now, more storms are on the way.

Daniel Rothberg January 6th, 2023 at 2:00 AM Environment Government

SHARE

An NV Energy crew works to restore power in northwest Reno on Jan. 2, 2023. (David Calvert/The Nevada Independent)

On New Year's Eve, Jennifer Naprstek and her family lost power as heavy, wet snow downed energy lines across western Nevada, with disruptions extending about 100 miles from Reno-Sparks to Smith Valley. Four days later, Naprstek was still waiting for electricity to come back.

"We just need the power back on," she said. "We need the heater back on."

Naprstek lives in an older Sparks neighborhood, and she said the prolonged outage has taken a toll on her family and their pets, including four cats — Precious, Freddy, Jason and Midnight — and a guinea pig named Ethel. They are charging their phones in the car, and with the inside of their home in the low 40s, they have been shuttling back-and-forth to stay with family. Naprstek said she realizes "people are struggling just as much as I am," especially her elderly neighbors.

Even so, it's been stressful to go this long without power, she said with a note of frustration that was shared by many this week. All told, more than 70,000 customers lost electricity, NV Energy reported, with many outages clustered in the urban areas of Reno, Sparks and Washoe County.

Throughout the week, the utility's field repair crews have worked to fix damaged infrastructure. Still, many residents faced multi-day outages. Many more were also frustrated by NV Energy's automated communication system, which was churning out overly optimistic time estimates for completing the repairs (the utility has since stopped using the system). As of Wednesday afternoon, fewer than 1,000 people were disconnected, making Naprstek one of the last to get power back.

"I want to know how they determine who is more important than whomever to get the heat back on," she said. "Will they compensate us for loss of this time? Will they help us with our bill?"

The storm that hit western Nevada over New Year's Eve was the first of several that are forecast to blanket the West with precipitation during the first two weeks of 2023. These storms can be difficult to forecast, with abrupt changes in temperatures dictating whether precipitation falls as snow or rain — a variable that greatly affects a storm's impacts, from power outages to flooding.

"Expect the unexpected," cautioned David Fogerson, the state's chief emergency manager, in an interview on Wednesday. In the coming days, he said the public should "stay abreast of the news and the local weather to know what is going on. Have a plan. Have a kit. And be ready."

Downtown Reno on Jan. 4, 2023. (David Calvert/The Nevada Independent)

On the final day of 2022, as the Truckee River and Carson River began to rise, meteorologists had predicted a warm and rainy storm to hit western Nevada. But when the storm finally arrived, it pumped cold air into the region, meaning snow, not rain, fell in the valleys and foothills. Below 5,000 feet of elevation, about six to 12 inches of snow fell in Reno and 12 to 30 inches fell in Carson Valley.

The snow significantly reduced major flood risk in the region's watersheds, especially within the creeks and main tributaries of the Carson and Susan rivers. But the unexpected snow brought a slew of other cascading impacts: Emergency officials quickly pivoted from flood preparations to plowing main roadways, and power outages hit as the storm crippled infrastructure.

The unplanned snowfall, storm conditions and the widespread outages left some of the region's most vulnerable, including unhoused residents, searching for shelter and a place to stay warm. In Washoe County, the Cares Campus shelter has been nearly full throughout December. Five western Nevada counties and three tribal nations opened warming centers, Fogerson said.

Lilith Baran, policy manager for ACLU Nevada, said prolonged exposure to cold temperatures under 50 degrees pose significant health risks, especially for unhoused residents. Those who lost power faced a situation that is the reality for many for most months of the year.

"That information has been given repeatedly through social media and public testimony," she said, advocating for warming centers that open when temperatures drop below 50 degrees (the current centers open when the temperature drops below 35). "But they are not fixing it."

She said it's everyone's responsibility to practice caring for one another as much as possible, especially during cold storm events that can cause further displacement as well as risks to health and safety. Whenever there is the possibility of floods, those risks can be even greater.

During the storms last year, Baran said, "there were people living in the storm drains, and we were walking through six inches of water to get people's belongings into a motel room."

Widespread power outages

The outage, in both its geographic range and its complexity, was a large-scale emergency event for the state's largest utility, NV Energy. On Tuesday, Nevada utility regulators opened an o cial investigation into the incident. The Public Utilities Commission of Nevada, known as the PUCN, requested the company submit a report by Wednesday detailing the incident and its response.

In an interview Wednesday evening, NV Energy CEO Doug Cannon said the utility, working with local governments, had prepared for flooding. But after the storm instead pushed in heavy, wet snow, it collected on the branches of trees, many of which fell, breaking utility lines and poles.

At the peak, about 71,000 customers lost power, with about 1,000 different nodes across the grid causing outages, nearly five times the 200 outage points the utility expects to see in a big storm.

Cannon said company executives and employees planned to personally call all 500 customers still without power by Wednesday evening. He said the utility's message is this: "We understand this is a huge disruption in your life. Power has become such an essential part of our personal lives. And we recognize that not only is not having power a disruption, but not having power during these cold temperatures has created significant discomfort. And for that, we're sorry."

"That is never what we want to see our customers experience," he added.

An NV Energy crew works to restore power in northwest Reno on Jan. 5, 2023. (David Calvert/The Nevada Independent)

Typically, the utility stations about 50 to 60 line workers between Reno and Carson City. They are on the frontlines of fixing damaged energy infrastructure during storms in western Nevada.

"Normally, that is plenty of staff to deal with normal storm outages that we might see. Because of the size of this event, and work to get customers back on, we've increased the size of that [workforce] to between probably 160 and 170 personnel," Cannon said, noting that line workers have come from Las Vegas, other utilities such as PacifiCorp, and contractors across the West.

Those workers, Cannon said, will stay in place with more precipitation heading to Nevada in the coming week. Nevada is not alone. Across northern California, utilities have reported significant power outages amid a fierce **"bomb cyclone"** that drenched the area Wednesday and Thursday.

More storms expected to hit

What meteorologists and Nevada emergency managers are watching for is how yet another storm system develops over the weekend and into next week. That system, an atmospheric river, or what some liken to **"rivers in the sky,"** could create more risk of flooding and damage.

"How that forecast plays out, and the absolute rain and snow elevations, are going to have a tremendous effect on the impacts," said Tim Bardsley, a hydrologist with the National Weather Service in Reno. Depending on that, "you're talking more snow impacts or more rain impacts."

A lot of this hinges on temperature. If the storm is colder, forecasters might expect to see snow at a lower elevation. If it is warmer, however, then there could be more rain, raising concerns of flooding, especially in otherwise small creeks and tributaries that feed river channels. With snow accumulated on the valley floor and foothills, rain could accelerate the pace at which it runs off.

"We watch the [rain] gages as well as the forecast, and we are watching the river levels very carefully," said E. George Robison, who directs the Truckee River Flood Management Authority.

It's too early to tell exactly where the atmospheric river could hit next week. He said residents in flood prone areas should always prepare for the impacts of winter storms. On Wednesday, Washoe County released a list of areas where residents **can pick up sandbags.**

Extreme variability, shifting between dry spells and intense precipitation, is not a new trend for California or northwest Nevada. But recent research has pointed to more "weather whiplash."
"A lot of that is a function of the warmer climate being able to hold more water vapor," he said.

An NV Energy crew works to restore power in northwest Reno on Jan. 5, 2023. (David Calvert/The Nevada Independent)

The flurry of precipitation this month comes as Nevada and much of the West has faced several years of drought and low reservoirs. According to the U.S. Drought Monitor, the entire state continues to face some level of drought, though **conditions improved slightly** after the last storm.

In the mountains across Nevada, including in the Humboldt River watershed, the recent storms have **boosted the snowpack**, a critical measure for water supply in the West. In the spring, snow accumulated on mountains across the region gradually runs off into creeks and into large rivers.

In western Nevada, the snowpack is hovering around or above 200 percent of average. That is welcome news for water managers, especially in the Lahontan Valley at the end of the Carson River.

The valley's farmers, in and around Fallon, typically rely on diversions from the Truckee River to supplement their supply. With the Truckee Canal under construction as part of work by the U.S. Bureau of Reclamation, irrigators are relying entirely on water from the Carson River.

"It's hard to even think about drought when you have this much rain and snow," said Dan McEvoy, an associate research professor with the Desert Research Institute. "[But] you can't say yet that the drought is over, even with about two more weeks of storms."

The storms, McEvoy said, would need "to continue throughout the winter."

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- NV Energy – $258,950

Daniel Rothberg
Daniel Rothberg is a staff reporter covering water, climate change and public land.

reno gazette journal

NEWS

Drought conditions improving throughout Nevada; more weather on its way

Amy Alonzo
Reno Gazette Journal

Published 11:00 a.m. PT Jan. 6, 2023 | **Updated 11:09 a.m. PT Jan. 6, 2023**

The icy roads and highway closures plaguing Northern Nevada are a pain for traveling, but the storms behind them are making a dent in the drought that has plagued the West the past several years.

Reno has had its second-wettest start to the water year on record; the water year runs from Oct. 1 to Sept. 30.

The city has received 6 inches of rain since Oct. 1 – about 3.5 inches above average. And on

Dec. 31, the city saw its 15th-highest one-day snowfall in recorded history.
"All these systems are making a dent in the drought. Every little bit helps," National Weather Service Meteorologist Amanda Young said.

Over the past week, Lake Tahoe has risen about a foot and is now sitting above its natural rim, and snowpack in the Sierra is nearly three-quarters of median with several months of winter left to go.

In the Truckee Basin, not one more snowflake could fall this winter and the region would still be sitting at 68 percent of its annual median snowfall, according to Jeff Anderson, state hydrologist. Last winter, the Tahoe area finished with 78 percent of its median snowpack.

But more snowflakes will fall.

Mt. Rose Ski Tahoe and Donner Pass could see more than three feet from Saturday through Monday and Carson Pass is expected to receive more than four feet. Reno will see a mix of rain and snow through next week with temperatures above freezing.

Anderson estimates the next few storms will bring about 8.5 more inches of snow water to the Sierra – meaning the mountains will reach levels they usually see around April 1 by just the middle of January.

There is less than a 10 percent chance the entire water deficit will be erased this winter, as they were in 1995 and 2017. But drought status has improved remarkably since early October, according to Anderson.

As of Jan. 3, less than 25 percent of the state was classified as being in extreme drought; at the start of October, nearly 50 percent of the state was classified as being in extreme drought.

Amy Alonzo covers the outdoors, recreation and environment for Nevada and Lake Tahoe. Reach her at aalonzo@gannett.com.

What this series of atmospheric rivers says about California's drought and water future

Manola Secaira

Friday, January 6, 2023 | Sacramento, CA

Watt Ave. near Alta Arden Expressway in the Arden Arcade area of Sacramento County on Thursday, Jan. 5, 2023.

Andrew Nixon / CapRadio

It's been years since California has seen a series of storms like those hitting the state now. They've caused evacuations, power outages and flooding, all of which are a hazard to people in impacted areas.

"In terms of overall flood risk, one atmospheric river is typically not enough in order to drive severe concerns," said Paul Ullrich, a professor of Regional and Global Climate Modeling at UC Davis.

But multiple storms in a row is a different story, he said.

"When you have these sequential atmospheric river events, then you really have to be worried about reservoirs overtopping, soil saturation and other drivers of widespread flood damage," Ullrich said.

This dump of precipitation might also have positive impacts on California's water supply. Ullrich said he remembers a series of atmospheric river events that hit California in 2016 and 2017 and helped "pull us out of that major drought that we had at the time."

"Probably, we're going to see that again this year," he said.

But although this rash of storms could help the state's water supply ahead of the summer, researchers say it also reveals weaknesses in the state's flood-prevention infrastructure and points to more severe weather to come.

California's unpredictable winters getting more extreme

During the fall of 2022, the National Oceanic and Atmospheric Association predicted California would have a relatively dry winter — a prediction that now, of course, has proven incorrect. Ullrich said California's winters are notoriously hard to predict because of the state's extreme and variable weather.

However, Ullrich added that the difference between a "dry" and "wet" winter can be very slight in California.

"California is very unique in that so much of its precipitation for the year comes on so few days," he said. "As a consequence, if you take some of those days away, if you turn them from wet days to dry days, suddenly it changes the whole total annual precipitation received by the state."

Ullrich said the level of precipitation coming from this storm isn't unprecedented, for the most part. Overall levels of annual precipitation in Northern California have stayed fairly consistent.

But a warming climate has encouraged more extreme weather events, he said. Warmer temperatures mean the capacity for more water vapor held in the air, which can lead to more precipitation all at once.

“What we are generally seeing is that some of the more extreme events are becoming more common,” he said. “What used to be a 1-in-100 year event is now becoming a 1-in-20 year event, or even more frequent than that.”

What this means for drought conditions

While the current series of storms won’t fix the state’s issues with drought, it does give Northern California a leg up. Precipitation from the storm will likely help replenish reservoirs and better prepare the region’s water supply ahead of next summer.

Nicholas Pinter, associate director of UC Davis’ Center for Watershed Sciences, said that he’s optimistic about the outcome of this storm.

“With the water behind us and the forecast coming in, it's pretty sure that we're going to fill all the reservoirs in Northern California and at least temporarily take a bite out of our drought situation,” he said.

So far, storms have not surpassed the intensity of the atmospheric river that hit California over the New Year's Eve weekend. Pinter said this is a good thing for our water supply and that more negative impacts can be avoided as long as storms don’t become more severe. For now, the heavy rain hasn’t led to flooding of bigger rivers like the Sacramento or San Joaquin, which Pinter said is largely due to the help of nearby reservoirs.

“The hope is that it's going to stay spread out,” he said. “The fear is that this is going to continue, [that] we're going to get … this whole freight train of storms coming in. We're watching very closely what the Pacific is going to send us.”

Pinter said that he’s hoping for smaller, continuous storms moving forward, but it’s hard to predict what will happen next. Among researchers, California is known for its widely variable weather.

Aging infrastructure around California rivers

While large rivers like the Sacramento have not flooded over during this storm, other smaller rivers have seen some flooding, like the Cosumnes River near Elk Grove. This river, like many others in the state, has levees built around it to keep back flooding.

But as this storm has raged on, some of these levees have broken and failed to prevent overflow.

“Some of them have been built decades ago,” said Helen Dahlke, an associate professor in Integrated Hydrologic Sciences at UC Davis. “And we haven't really invested that much funding into upkeeping, just even checking the status of these levees, so there is definitely some aging infrastructure that could potentially become an issue.”

Dahlke said much of this infrastructure was built to control streamflows decades ago, when residents had different expectations of California’s climate. It’s not equipped to the current reality: Warming temperatures due to climate change could potentially ramp up the severity of future storms, which means more streamflow to manage, she said.

But Dahlke added that flooding is a natural part of California’s ecosystem and feeds into the state’s underground water supply; it can’t be avoided completely.

“Before we had settlers and cities moving in, much of the [Central Valley] actually flooded regularly during these storms,” she said. “And that was really the main mechanism for getting water into our groundwater systems.”

Moving forward, Dahlke said that flooding and aging levee breaks are likely, so the next step is to be proactive about responding. Mechanisms to hold back water, like reservoirs, will still be necessary tools, but she said that there’s also discussion about infrastructure that allows rivers to flow more naturally.

“There is, for example, discussion along the river to set back some of these levees to widen the floodplain area so that the river has a little bit more room when it's really peaking,” she said. ”That would also have really positive benefits for groundwater recharge since more areas flooded and then more water could potentially seep into the ground.”

California isn’t an easy state to plan in; Dahlke said researchers have had issues forecasting winters here for decades due to the unpredictability of the state’s weather. All we can do, she said, is focus resources on being as prepared as possible for the next winter.

Bureau of Reclamation Releases Funding Opportunity for Water Reuse and Desalination Programs

Date: January 09, 2023

The Bureau of Reclamation released a Notice of Funding Opportunity (NOFO R23AS00076) for planning and pre-construction activities to facilitate the development of Title XVI Water Reclamation and Reuse projects, Desalination Construction projects, and Large-Scale Water Recycling projects. Applications for funding close on February 28, 2023. The Bureau is holding an informational webinar on January 11 at 10 am MST to discuss eligibilities. The webinar can be viewed here.

The NOFO covers activities of eligible applicants including the development of new water recycling and desalination feasibility studies, planning and preliminary design activities for water recycling or desalination construction projects, or environmental compliance activities for water recycling or desalination construction projects.

Applicants can apply for funding under two funding groups: Funding Group I applicants may request up to $1 million in federal funding for projects with an anticipated total project cost of less than $500 million, while Funding Group II applicants may request up to $5 million in federal funding for projects with an anticipated total project cost of greater than $500 million.

Eligible applicants, depending on the funding group, include States, Indian Tribes, irrigation districts, water districts, and state, regional, or local authorities, the members of which include one or more organizations with water or power delivery authority. Other eligible applicants include any agency established under state law for the joint exercise of powers, or a combination of entities described above. All applicants must be located in the Western United States or Territories under the purview of the Bureau of Reclamation, specifically: Arizona, California, Colorado, Hawaii, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, Wyoming, American Samoa, Guam, the Northern Mariana Islands, and the Virgin Islands.

This is the first time in recent years that the Bureau of Reclamation has made funding available for planning activities, and WateReuse stands ready to support our members in applying for funds. Please reach out with any questions to Greg Fogel.

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WaterNews

Federal Water Tap, January 9: EPA Delays PFAS Drinking Water Rules

The Rundown

- The EPA expects draft rules for two **PFAS in drinking water** to be published in March.
- President Biden signs three bills related to **tribal water rights** in Arizona.
- The Census Bureau identifies the number of **U.S. residents displaced** last year by weather disasters.
- An EPA draft report outlines the damage that **federal biofuels policy** has wrought on land and water.

And lastly, the White House issues new **climate accounting guidelines** for environmental impact statements.

“Climate change is a fundamental environmental issue, and its effects on the human environment fall squarely within [the National Environmental Policy Act’s] purview.” — Excerpt from the Council on Environmental Quality’s interim guidance [https://www.federalregister.gov/d/2023-00158] for how federal agencies should account for climate change and greenhouse gas emissions when assessing the environmental impacts of major federal actions. The guidance directs agencies to evaluate greenhouse gas emissions in dollar terms, using an accounting aid known as the social cost of carbon.

By the Numbers

3.3 Million: People in the United States who were displaced last year due to weather disasters, according to Census Bureau data [https://www.census.gov/data-tools/demo/hhp/#/?measures=DISPLACED] . It is the first time the statistics agency has asked this question in an annual survey. Being displaced could mean finding a hotel room to ride out the storm. Or it could mean living in a temporary trailer because your home was damaged. Displacement was most widespread in Louisiana, where 15 percent of the state’s residents left home last year because of a weather disaster. People who were displaced tended to be poorer than the average American. Most people were able to return home within a week. But for some, the dislocation was permanent. About one in six residents who were displaced moved elsewhere after the storm.

In context: Droughts Push More People to Migrate Than Floods [https://www.circleofblue.org/2021/world/droughts-push-more-people-to-migrate-than-floods/]

News Briefs

EPA Delays PFAS Drinking Water Rules
The EPA updated its anticipated timetable [https://www.reginfo.gov/public/do/eAgendaMain?operation=OPERATION_GET_AGENCY_RULE_LIST&currentPub

for drafting and finalizing new rules and regulations, indicating that draft rules [https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202210&RIN=2040-AG18] for two PFAS chemicals in drinking water will be delayed until March 2023.

The agency said in February 2022 that it would regulate PFOA and PFOS in drinking water and issued the draft by the end of the year. It now appears that doing so will take another three months.

The agency wrote in a statement to Circle of Blue that it expects the draft "in the coming weeks." It added, "The draft proposed rule is currently undergoing interagency review, and EPA will issue the proposed rule for public comment when it clears the Office of Management and Budget (OMB). The agency anticipates finalizing the rule by the end of 2023."

As for other rules, additional revisions, in draft form, to the Lead and Copper Rule are expected in August 2023.

Tribal Water Rights
President Biden signed three bills related to water rights for tribes in Arizona.

One bill allows the Colorado River Indian Tribes to lease their water [https://www.congress.gov/bill/117th-congress/senate-bill/3308] for use off of the reservation. Another settles water rights [https://www.congress.gov/bill/117th-congress/senate-bill/4104/text] for the Hualapai Tribe. The third amends [https://www.congress.gov/bill/117th-congress/senate-bill/3168] an existing water rights settlement with the White Mountain Apache Tribe.

In context: In Drying Colorado River Basin, Indian Tribes Are Water Dealmakers [https://www.circleofblue.org/2015/world/in-drying-colorado-river-basin-indian-tribes-are-water-dealmakers/]

Studies and Reports

Environmental Impact of Biofuels
The federal government's mandate to derive transportation fuels from plants has damaged water and land, sending nutrients and pesticides into waterways where they impair ecosystems and make people sick.

An EPA draft report [https://cfpub.epa.gov/ncea/biofuels/recordisplay.cfm?deid=353055] on the environmental impact of the biofuels standard outlines the consequences.

Converting grasslands to corn and soybean fields increases nitrogen and phosphorus in soils, rivers, lakes and groundwater. Between 2007 and 2016, as much as 2 million acres of land were put into crop production due to the biofuel mandate. The impact on water consumption is more difficult to quantify due to factors such as geographical region, irrigation efficiency, market prices, and weather, the report states.

Mandated by an act of Congress, the report covers nearly a thousand pages. It focuses on four fuel types that are the largest contributors to the standard: corn ethanol, soybean biodiesel, fats/oils/ grease, and Brazilian sugarcane.

Public comments on the report are being accepted through March 6. Submit them at *www.regulations.gov* using docket number EPA-HQ-ORD-2020-0682.

The full report can be found here [https://ordspub.epa.gov/ords/eims/eimscomm.getfile?p_download_id=545876] . But warning: it is a large file.

On the Radar

FERC Meeting on California Hydro Project Federal energy regulators will hold a virtual meeting [https://www.ferc.gov/news-events/events/technical-meeting-regarding-potter-valley-hydroelectric-project-no-77-01102023] to discuss interim changes to the Potter Valley hydroelectric project that would protect fish species.

The project's two Eel River dams, located in northern California, generate hydropower and divert water into the Russian River. They also block habitat for salmon and steelhead. Pacific Gas and Electric, the project operator, has said it does not intend to relicense the dams.

Wyoming Dam Assessment
The Natural Resources Conservation Service says it will prepare an environmental impact statement [https://www.federalregister.gov/d/2022-28245] for a dam and reservoir on the West Fork of Battle Creek, in Wyoming. The goal is to provide late-season irrigation water for 19,000 acres of farmland.

The 264-foot-high dam would store 10,000 acre-feet of water.

Federal Water Tap [http://www.circleofblue.org/water-tap/] is a weekly digest spotting trends in U.S. government water policy. To get more water news, follow [http://twitter.com/circleofblue] Circle of Blue on Twitter and sign up for our newsletter [http://www.circleofblue.org/waternews/contact/weekly-newsletter-sign-up/] .

[https://www.circleofblue.org/author/brett/]

Brett Walton
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Brett writes about agriculture, energy, infrastructure, and the politics and economics of water in the United States. He also writes the Federal Water Tap [https://www.circleofblue.org/water-tap/] , Circle of Blue's weekly digest of U.S. government water news. He is the winner of two Society of Environmental Journalists reporting awards, one of the top honors in American environmental journalism: first place for explanatory reporting for a series on septic system pollution in the United States [https://www.circleofblue.org/2016/world/brettwalton/] (2016) and third place for beat reporting in a small market (2014). He received the Sierra Club's Distinguished Service Award in 2018. Brett lives in Seattle, where he hikes the mountains and bakes pies. Contact Brett Walton [https://www.circleofblue.org/contactbrettwalton/]

DAVOS 2023

How to address the complex issue of water conservation

Jan 9, 2023

A systems thinking approach to water conservation can help us protect this precious resource. Image: Pexels.

Sundararajan Mahalingam

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Nidhi Pundhir

Head, HCL Foundation, HCLTech

This article is part of:

World Economic Forum Annual Meeting

- **Freshwater ecosystems, such as rivers and lakes, are the lifeblood of our planet.**
- **We must protect these complex, fragile systems from the impacts of climate change.**
- **A systems thinking approach to water conservation can help us protect this precious resource.**

The Earth comprises diverse and interconnected ecosystems: the atmosphere, water, ocean, land, forests, biodiversity and social systems. Not only are these complex systems always in a state of flux, but they also have a symbiotic and often fragile relationship and interdependence with one another.

However, this dynamic interdependence and engagement can sometimes become unbalanced and lead to unwanted friction and unexpected repercussions. For example, deforestation in the tropics not only has an immediate effect on regional climate but also creates long-term climatic variances in totally different regions elsewhere on the planet. Whenever this critical interdependence gets imbalanced or disturbed, the consequences are often unwanted and devastating.

Taking a systems thinking approach to water

When focusing on nature conservation initiatives, it is important to understand these complex problems from a systems thinking perspective, not only to solve them but also to prevent such problems from occurring in the first place. Systems thinking is an approach to understand and assess the structure, dynamics and interactions amongst the various systems, including physical elements, institutions, society and mental models that shape the world, as they interact and co-evolve to co-create the world around us.

A system contains both the causes of its success and failure and it is possible to solve more than one problem at the same time, if the system issues are addressed correctly. For this, it's also important to identify the accurate leverage points within a system. An intervention or innovation will be effective and sustainable only if it does not create any new problems.

Have you read?

- **How the water sector is using innovative tech to become more resilient and sustainable**
- **How can innovation help solve the freshwater crisis?**
- **How 'aquapreneurs' can help solve the global water crisis**

Water is life and it's central to nature conservation. In particular, freshwater is a limited natural resource. Freshwater ecosystems are essential for human survival as they are a major source of drinking water: they are the lifeblod for local ecosystems along with the native flora and fauna they host. But water conservation is a complex problem, as there is a possibility of several causes/drivers, such as unsustainable patterns of consumption, pollution, loss of green cover, etc., that can be a hindrance.

Analyzing the complex problems of water conservation, itself exacerbated by climate change, through a systems thinking approach can help practitioners and innovators break down the complex system into smaller process and address the root causes rather than superficially addressing the problem.

One of the examples to understand different systems and their interactions is to appreciate how the introduction of wolves' in Yellowstone National Park had a cascading and beneficial effect upon the entire ecosystem including the rivers that f low through the park.

Addressing complex water problems

The success of water conservation projects lies in identifying leverage points and analyzing the various systems and their continuous interactions with each other. Anthropological practices are central to understanding as well as resolving this issue. Understanding and analyzing feedback loops is important.

In integrated water resource management, a sound understanding of the water cycle, drainage patterns, and identification of the recharge (leverage) points can play a crucial role in groundwater recharge. Even when this is achieved to perfection using the best scientific means and nature-based solutions, should one fail to build ownership of communities, understand local culture, recognize the social system and bring in sustainable approaches towards behavioural change, outcomes will be limited at best and all investments will go waste.

DISCOVER

What is the Forum doing to address the global water challenge?

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Often, projects tend to address complex water conservation problems in isolation by ignoring the feedback network that connects different ecosystems – this results in "unanticipated events". Project implementers/ innovators need to understand that every ecosystem is governed by feedback and this cannot be ignored. Missing feedback and delayed closure of feedback loops are the most common causes of system malfunction.

Water conservation efforts in India

In India, waterbodies such as ponds, wetlands, lakes, etc., play a vital role in maintaining the ecological balance, recharge groundwater levels and help with flood control. These water systems are also deeply enmeshed with local and regional socio-cultural practices and may also have a gender dimension.

However, many of these water bodies now face a lot of stress due to anthropogenic activities, pollution, encroachment, etc. which are threatening to de-stabilize the ecosystem. In fact, encroachment of these waterbodies has resulted in flash floods in cities like Mumbai and Chennai, which is a case of delay in feedback and intervention.

The interventions planned should be innovative, adaptive, and easily scalable. HCLTech under its CSR initiative – Harit by HCL Foundation – has strategically adopted a systems thinking approach towards conservation of waterbodies that has enabled the recharge of around 36 billion litres of water across India in less than three years. From geo-mapping of waterbodies (especially ponds), community mobilization and community led action, state partnerships, restoring oxygen levels using innovative scientific techniques, deploying nature-based solutions, oprovisioning flourishing native biodiversity, all elements are parts of a complex problem, addressed systematically.

Adopting the same systems thinking approach (landscape approach) can bring significant benefits to river conservation, given the fragile yet important interplay of several systems with each including the natural water cycle, forest ecosystem, social system and local biodiversity.

For example, the plantation of native saplings in the river catchment area would help develop a strong root network in the long run and prevent topsoil erosion, thus helping control gully formation. This will also help retain soil moisture and the plantation will create a healthy terrestrial environment supporting the growth of the associated species leading to the redevelopment of what was originally a thriving and self-sustained ecosystem. Additional benefits in terms of provision of ecosystem services include water conservation, preventing soil erosion and enhancing climate resilience.

Therefore, a systems thinking and integrated approach helps conservationists accrue both tangible and intangible, quantitative and qualitative impact throughout the project life cycle. Irrespective of the returns, efforts must continue because water will always be central to life.

reno gazette journal

NEWS

Tired of the snow and rain? A brief respite is in sight, but more storms are on the way

Amy Alonzo
Reno Gazette Journal

Published 12:14 p.m. PT Jan. 9, 2023 | **Updated 1:42 p.m. PT Jan. 9, 2023**

Northern Nevada is getting a break from the snow – in the form of rain.

An atmospheric river is dousing the region with heavy rainfall today, causing minor flooding in urban areas with poor drainage and where snowbanks have blocked storm drains.

Drivers should plan on water on roadways and be on the lookout for rockfall in canyons and mountain roads.

The good news? Major flooding is not expected.

A second wave of the storm coming in later today will bring a couple inches of snow to Reno and other valley floors and three to six inches in the foothills.

But there's a break in sight. The National Weather Service is forecasting dry conditions Thursday and Friday in Reno before another storm moves in over the weekend.

Palisades Tahoe has received eight inches of snow in the past 24 hours, bringing the resort's total to 268 inches for the season. Mt. Rose Ski Tahoe has received between eight and 10 inches of new snow and has 251 inches for the season.

The continual string of storms is "atypical" for the region, according to National Weather Service meteorologist Scott McGuire.

While conditions on the valley floors are calm but soggy, winds are howling in the mountains. Palisades is reporting winds of more than 100 mph and is closed, as is Mt. Rose.

An avalanche warning has been forecast for the region, and the risk is high for backcountry snow enthusiasts, according to the Sierra Avalanche Center. Snowfall rates of two to four inches per hour are forecast through noon in the mountains, and snow is falling faster than it can stick to the old snow surface, creating hazardous conditions.

A large avalanche occurred yesterday just south of Carson Pass and Mt. Rose Highway was closed Sunday afternoon for avalanche mitigation.

The mix of mountain snow and precipitation has been a boon for local reservoirs, according to Federal Water Master Chad Blanchard.

Coming into winter, reservoirs like Boca, Prosser and Stampede were running low. Now, Prosser has reached flood control level, meaning it is full until spring when the reservoir will take in more water to manage flooding concerns during spring melt.

Lake Tahoe has risen about a foot and a half – about 180,000-acre feet of water.

"That's a tremendous boost to our water supply," Blanchard said. "No weather forecast can tell us if it will be wet, dry or in between. What we are forecasting is to be able to store a lot more water."

While the string of storms has been good for the West, they have also come with challenges. Twelve people in California have died from them so far, and extensive damage has been reported.

Amy Alonzo covers the outdoors, recreation and environment for Nevada and Lake Tahoe. Reach her at aalonzo@gannett.com.

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News Release

For Immediate Release

Water year off to great start, current snow amounts better than peaks measured last year

Farmers.gov sent this bulletin at 01/09/2023 06:59 PM EST

Water year off to great start, current snow amounts better than peaks measured last year

RENO, Nev. -- Across the region, 2023 already ranks as one of the strongest starts to winter accumulation on record. Snowpacks across Nevada and the Eastern Sierra are 136-258% of median and the near non-stop barrage of storms since Christmas is causing percentages to increase daily with current weather forecasts calling for additional storms through the third week of January.

Based on January 9 NRCS SNOTEL weather station data back to 1981, the Carson River Basin has its greatest snow water amount for this time of year on record. Other notable snow water amounts include Walker River Basin, second highest behind 1997; Humboldt River Basin, third highest behind 1984 and 1989; and Eastern Nevada, fourth highest behind 1984, 2005 and 2011. The Lake Tahoe and Truckee River basins are currently ranked in the top ten and are poised to jump into record territory very soon as snow continues to fall.

“A good start is no guarantee,” said Jeff Anderson, NRCS Water Supply Specialist.
“Last year brought record snow to the Sierra in December, but accumulation from January through March was record dry and led to a below normal spring runoff. While chances of such a historic dry period again this year are low, current numbers should be viewed with cautious optimism since snow water amounts are still only about half of what was measured at the end of big winters such as 2019, 2017 and 2011.”

Chad Blanchard, Federal Water Master for the Truckee and Carson Rivers, also expressed cautious optimism over large improvements in drought conditions stating more snow will be needed through the winter to ensure enough storage to meet demands this summer and fall and provide carryover storage going into next year.

“The precipitation that we have received so far has provided a big boost to our water supply,” Blanchard said. “We came into this winter with Lake Tahoe nearly 6 inches below the natural rim, no water coming out of the dam, a dry river just below the Lake and the other reservoirs at very low levels. As of January 9, Lake Tahoe has gained 1.5 feet and is now one foot above its rim. The significant rain and snow storms have provided enough runoff to meet the required minimum flows in the Truckee River and have allowed storage of water in the other reservoirs in the system which will provide a large benefit going into summer.”

The most up to date snowpack levels can be tracked on the Nevada NRCS Website, https://www.nrcs.usda.gov/wps/portal/wcc/home/quicklinks/states/nevada/. The information can also be found by searching for NRCS Nevada Snow Survey.

Snowpack Conditions as of January 9, 2023

Lake Tahoe Basin - Snowpack is 217% of median, 7th highest for date since 1981. Basin snow water content averages 22.2 inches which is 83% of normal springtime peak of 27.0 inches which normally occurs March 28.

Truckee Basin – Snowpack is 205% of median, 9th highest for date since 1981. Basin snow water content averages 20.6 inches which is 77% of normal the normal springtime peak of 26.7 inches which normally doesn't occurs March 27.

Carson Basin – Snowpack is 237% of median and ranks the highest on record for the date since 1981. Basin snow water content averages 22.2 inches which is 107% of the normal springtime peak of 20.8 inches which normally occurs March 27.

Walker Basin - Snowpack is 258% of median, 2nd highest for date since 1981. Only 1997 had more snow on this date. Basin snow water content averages 22.0 inches which is 107 % of normal spring peak of 20.5 inches and normally occurs March 27.

Humboldt Basin (Interstate 80 corridor from Winnemucca to Elko) - Snowpack is 204% of median, 3rd highest for date since 1981. Only 1984 and 1989 had more snow on this date. Basin snow water content averages 11.3 inches which is 78% of normal spring peak of 14.4 inches which normally occurs March 30.

Eastern Nevada (Route 50 corridor Austin, Eureka and Ely) - Snowpack is 244% of median, 3rd highest for date since 1981. Only 1984, 2005 and 2011 had more snow on this date. Basin snow water content averages 11.6 inches which is 90% of normal spring peak of 12.9 inches which normally occurs April 1.

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Nevada January 9, 2023 Snowpack Graphic.pdf

LOCAL NEWS

California snowpack soars to nearly 200% of normal

A snow plow works to clear snow on a road, the morning after a winter storm pelted the region with a large amount of snow, in South Lake Tahoe, Calif., Sunday,…
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by: Marc Sternfield
Posted: Jan 9, 2023 / 10:09 AM PST
Updated: Jan 10, 2023 / 06:29 AM PST

SHARE

While many areas of California are coping with the destructive impact of relentless rainfall, the news is nothing but good when it comes to the state's snowpack.

As of Monday, California's snow water equivalent was 199% of normal for the date (January 9), according to the California Department of Water Resources.

California snowpack percentages. January 9, 2023. (California Department of Water Resources)

The Southern Sierra was 222% of normal. The Central Sierra was 201%, while the Northern Sierra/Trinity was 173%.

"We are seeing the best start to our snowpack in over a decade," DWR tweeted. "But it is only a start – most of the winter season has yet to unfold."

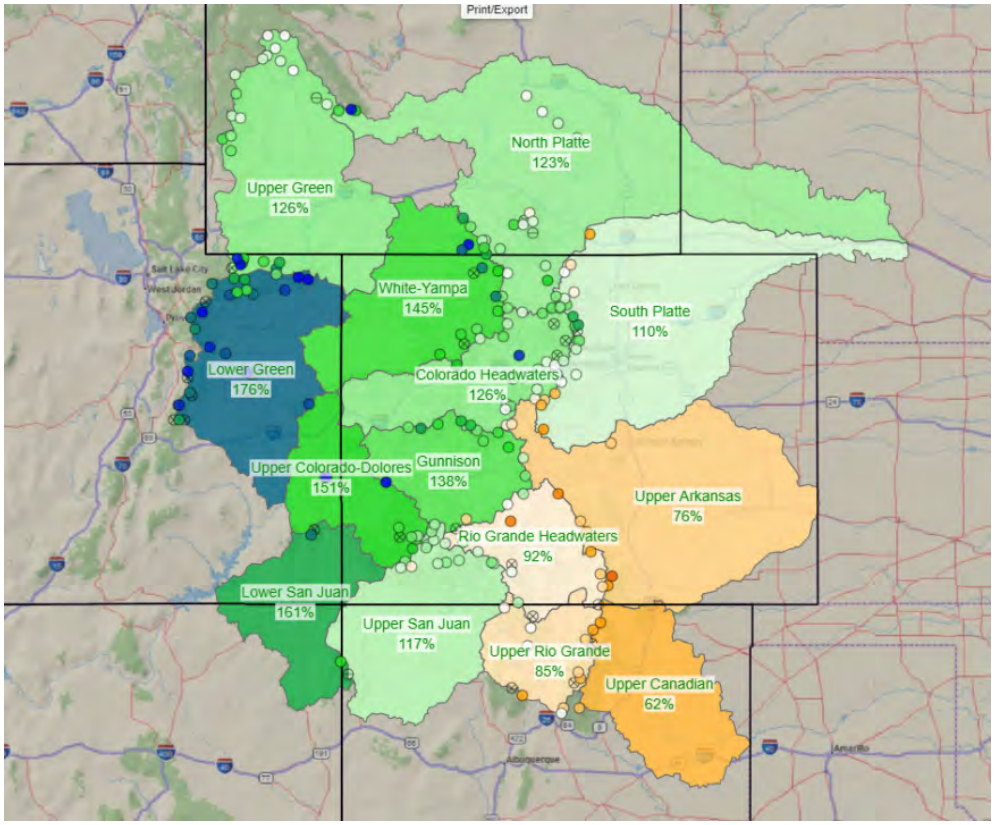
Southern California Weather Home Page ›

Water experts are reluctant to signal too much optimism since last winter California also saw snow accumulate to above-average levels through December, only to see January, February and March become the driest on record.

"It's great that we've been getting these storms, but we really can't predict how long this will keep up," Jeanine Jones, Interstate Resources Manager at DWR, told KTLA. "We are still significantly below the peak for the year as a whole, and that's the goal we're shooting for, not so much where we are right now."

Jones also says the series of drenching rainstorms might be too much of a good thing.

"We're happy that we're getting snowpack and we're happy that we're getting these storms. But we would like them to be suitably spaced out so we're not having the flood risk," she said.



Colorado River Snowpack. January 9, 2023. (Courtesy nrcs.usda.gov)

The snowpack outlook is also promising along the crucial Colorado River basins which feed Lake Powell and Lake Mead and is Southern California's primary source of drinking water.

Snow water equivalent in the Rockies generally range from 117% to 176% of normal as of Monday.

Suggest a Correction

Water year off to great start, current snow amounts better than peaks measured last year

Jan 10, 2023

In this photo provided by the California Department of Water Resources, forecasting chief Sean de Guzman, second from right, and engineers work the measurement phase of the first media snow survey of the season at Phillips Station in the Sierra Nevada Mountains, Calif., Tuesday, Jan. 3, 2023. The snowpack in California's mountains is off to one of its best starts in 40 years, officials announced Tuesday, offering hope that the drought-stricken state could soon see relief in the spring when the snow melts and flows into reservoirs that provide water for drinking and farming.

Kenneth James - hogp, California Department of Water Resources

Across the region, 2023 already ranks as one of the strongest starts to winter accumulation on record.

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Based on January 9 NRCS SNOTEL weather station data back to 1981, the Carson River Basin has its greatest snow water amount for this time of year on record. Other notable snow water amounts include Walker River Basin, second highest behind 1997; Humboldt River Basin, third highest behind 1984 and 1989; and Eastern Nevada, fourth highest behind 1984, 2005 and 2011.

The Lake Tahoe and Truckee River basins are currently ranked in the top ten and are poised to jump into record territory very soon as snow continues to fall.

"A good start is no guarantee," said Jeff Anderson, NRCS Water Supply Specialist. "Last year brought record snow to the Sierra in December, but accumulation from January through March was record dry and led to a below normal spring runoff. While chances of such a historic dry period again this year are low, current numbers should be viewed with cautious optimism since snow water amounts are still only about half of what was measured at the end of big winters such as 2019, 2017 and 2011."

Chad Blanchard, Federal Water Master for the Truckee and Carson Rivers, also expressed cautious optimism over large improvements in drought conditions stating more snow will be needed through the winter to ensure enough storage to meet demands this summer and fall and provide carryover storage going into next year.

"The precipitation that we have received so far has provided a big boost to our water supply," Blanchard said. "We came into this winter with Lake Tahoe nearly 6 inches below the natural rim, no water coming out of the dam, a dry river just below the Lake and the other reservoirs at very low levels. As of January 9, Lake Tahoe has gained 1.5 feet and is now one foot above its rim. The significant rain and snow storms have provided enough runoff to meet the required minimum flows in the Truckee River and have allowed storage of water in the other reservoirs in the system which will provide a large benefit going into summer."

The most up to date snowpack levels can be tracked on the Nevada NRCS Website at Nevada Snow Survey Homepage (usda.gov)

Snowpack Conditions as of January 9, 2023:

Lake Tahoe Basin - Snowpack is 217% of median, 7th highest for date since 1981. Basin snow water content averages 22.2 inches which is 83% of normal springtime peak of 27.0 inches which normally occurs March 28.

Truckee Basin – Snowpack is 205% of median, 9th highest for date since 1981. Basin snow water content averages 20.6 inches which is 77% of normal the normal springtime peak of 26.7 inches which normally doesn't occurs March 27.

Carson Basin – Snowpack is 237% of median and ranks the highest on record for the date since 1981. Basin snow water content averages 22.2 inches which is 107% of the normal springtime peak of 20.8 inches which normally occurs March 27.

Walker Basin - Snowpack is 258% of median, 2nd highest for date since 1981. Only 1997 had more snow on this date. Basin snow water content averages 22.0 inches which is 107% of normal spring peak of 20.5 inches and normally occurs March 27.

Humboldt Basin (Interstate 80 corridor from Winnemucca to Elko) - Snowpack is 204% of median. 3rd highest for date since 1981. Only 1984 and 1989 had more snow on this date. Basin snow water content averages 11.3 inches which is 78% of normal spring peak of 14.4 inches which normally occurs March 30.

Eastern Nevada (Route 50 corridor Austin, Eureka and Ely) - Snowpack is 244% of median. 3rd highest for date since 1981. Only 1984, 2005 and 2011 had more snow on this date. Basin snow water content averages 11.6 inches which is 90% of normal spring peak of 12.9 inches which normally occurs April 1.

Reno City Council Approves Annual Increase of Sewer Connection Fee Rates

Randi May

Jan 11, 2023

(January 11, 2023) During their regular meeting on Wednesday, the Reno City Council approved an ordinance that will amend Reno Municipal Code Title 12.

They amended it to revise the connection fee rates for both residential and industrial/commercial users, to establish the fees by service area, and to provide for an annual fee increase per the consumer price index-all urban consumers for the west urban area.

Proposed TMWRF Connection Fee	
Single Family Dwelling up to 31 fixture units	$ 12,002
Multi-Family Dwelling	$ 10,250
Micro-unit Dwelling (< 600 sf)	$ 8,310
Mobile Home Estates or Subdivisions (per space)	$ 12,002
Mobile Home Parks (per space)	$ 12,002
Res. Dwelling Unit Shared Kitchen or Rooming House Kitchen	$ 4,275
Rooming House (per room rental)	$ 3,842
Commercial Fixture Unit Fee	$ 554

Proposed RSWRF Connection Fee	
Single Family Dwelling up to 31 fixture units	$ 11,906
Multi-Family Dwelling	$ 10,168
Micro-unit Dwelling (< 600 sf)	$ 8,235
Mobile Home Estates or Subdivisions (per space)	$ 11,906
Mobile Home Parks (per space)	$ 11,906
Res. Dwelling Unit Shared Kitchen or Rooming House Kitchen	$ 4,241
Rooming House (per room rental)	$ 3,811
Commercial Fixture Unit Fee	$ 549

Proposed Lawton/Verdi Connection Fee	
Single Family Dwelling up to 31 fixture units	$ 14,594
Multi-Family Dwelling	$ 12,463
Micro-unit Dwelling (< 600 sf)	$ 10,095
Mobile Home Estates or Subdivisions (per space)	$ 14,594
Mobile Home Parks (per space)	$ 14,594
Res. Dwelling Unit Shared Kitchen or Rooming House Kitchen	$ 5,198
Rooming House (per room rental)	$ 4,672
Commercial Fixture Unit Fee	$ 673

Proposed System-Wide Connection Fee	
Single Family Dwelling up to 31 fixture units	$ 12,407
Multi-Family Dwelling	$ 10,596
Micro-unit Dwelling (< 600 sf)	$ 8,595
Mobile Home Estates or Subdivisions (per space)	$ 12,407
Mobile Home Parks (per space)	$ 12,407
Res. Dwelling Unit Shared Kitchen or Rooming House Kitchen	$ 4,419
Rooming House (per room rental)	$ 3,972
Commercial Fixture Unit Fee	$ 573

City of Reno

They say the existing sewer connection fee rates are not sufficient to pay for the future capacity needed at the Truckee Meadow Water Reclamation Facility (TMWRF), Reno Stead Water Reclamation Facility (RSWRF), and the respective sewer collection systems that carry the raw sewage from homes and businesses to these facilities.

Sewer connection fees are a one-time fee paid to connect to the sewer system either through a new or expanded existing use.

These fees are used to pay for increased capacity improvements within the sewer collection systems or treatment at water reclamation facilities and for the management of the resulting effluent.

The existing sewer connection fee rates have not increased or had any adjustments since 2014 and are not sufficient to pay for the future sewer capacity needed at the treatment plants or sewer collection system to accommodate future growth.

The City of Reno's Regional Infrastructure team is hosting a sewer connection fee public workshop on Thursday, November 10 at 6 p.m. on the first floor of Reno City Hall (located at 1 E 1st St, Reno, NV 89501) in the Council Chamber.

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Earlier this year, the City partnered with Farr West Engineering to conduct a sewer connection fee study.

The public workshop will explain the study findings and how it impacts the public.

A proposal will be presented to increase the sewer connection fee and how it will support continued growth and development in Reno.

City staff will obtain feedback from the public before taking the item to the Reno City Council for consideration.

The proposed one-time sewer connection fee would be for new uses, not user fees paid by existing customers quarterly. Businesses and entities that have paid sewer connection fees in the last three years were sent a mailer earlier this year, inviting them to the public workshop.

Sewer connection fees have not been increased since October 1, 2014. Increased sewer connection fees will pay for the expansion of the Truckee Meadows Water Reclamation Facility, Reno Stead Water Reclamation System, and sewer collection system from the development site to the water reclamation facility to allow for increased sewer capacity for all new development and growth in Reno.

A sewer connection fee study was conducted in 2022 by Farr West Engineering. The study reviewed setting fees based on separate sewersheds, a uniform fee, and whether to include potential grant funding or credits for the future sale of water rights.

Ultimately, the study recommended increasing sewer connection fees and setting the rate based on separate sewersheds and including an offset for the sale of future water rights.

Community members are invited to join in person or virtually. (link)

Randi May

Digital Content Producer

Lake Mead bathtub ring measures about 150 feet at Hoover Dam on Friday, June 25, 2021. Jeff Scheid/Nevada Independent)

Indy Environment: Nevada outlines framework for Colorado River cuts as states show their cards

Good morning, and welcome to the Indy Environment newsletter.

As always, we want to hear from readers. Let us know what you're seeing on the ground and how policies are affecting you. Email me with any tips at daniel@thenvindy.com.

If you received this from a friend, sign-up here to receive it in your inbox.

At the end of last year, the seven states in the Colorado River Basin committed to once again work together and negotiate a consensus framework for making significant cuts to water use, an attempt to stabilize the nation's two largest reservoirs and avoid an even deeper shortage crisis.

The states recommitted to considering a consensus deal, by Jan. 31, after several deadlines passed in 2022 with seemingly irreconcilable differences over how to make painful cuts in a watershed relied upon by 40 million people who use the river for drinking water and agriculture.

The new round of negotiations come as the federal government prepares to take unprecedented administrative action on the Colorado River. **In November, federal water managers issued a formal notice that they planned to analyze options to update the river's operating rules, agreed upon in 2007, to meet the severe shortage conditions facing the watershed.**

Among the states, there is agreement that the Colorado River faces a crisis. The river's two largest storage reservoirs — Lake Powell and Lake Mead — are hovering at critically low levels.

Lake Powell, which sits at the border of Utah and Arizona, upstream of the Grand Canyon, is 24 percent full. Downstream, Lake Mead is only 28 percent full (and the amount of available water could be even lower, as states have banked large volumes of water in the lake for future use).

It is easy to get lost in the details. **The bottom line is less water has come into the river, because of prolonged drought and a drying climate. At the same time, states downstream of Lake Powell have continued to overdraw on the two reservoirs, straining the system. The only short-term solution is to cut back.**

The U.S. Bureau of Reclamation, tasked with managing much of the river's infrastructure and water deliveries, has made it clear it wanted to see significant cuts before now. And the agency is preparing to take action this year. There seem to be two paths on the table.

One is a consensus-based framework agreement: By Jan. 31, the seven states come up with a framework for a plan that would stabilize Lake Mead and Lake Powell from crashing to extremely low elevations that would threaten hydropower production or water deliveries. The other is the agency imposes actions it could take using its authority.

Both alternatives are expected to be analyzed as part of a formal environmental review required by the National Environmental Policy Act, known as NEPA. In that seemingly technical process, Dec. 20 was an important date. It was a deadline for the public, including the seven states and their top negotiators, to submit formal comments about how they want the cuts to unfold.

The letters, linked below, are important public documents. Although these letters are written in legalistic terms, they outline how the seven states view key issues about how to move forward. They show areas where the states agree and where states diverge.

Of note was the comment letter from Nevada, which outlined a possible framework to achieve consensus. It was the only state-led letter that suggested a comprehensive framework.

In fact, two other letters specifically refer to the Nevada plan as a starting point for the state discussions. Arizona officials wrote that they "endorse the consideration" of Nevada's plan "as a starting point for development of a consensus-based set of actions. And a Wyoming official said the state will consider Nevada's proposed framework, without endorsing any one element of it.

Wyoming State Engineer Brandon Gebhart wrote in the state's public comment letter that the state actually "opposes some of the specific elements of [the Nevada] proposal," but it "intends to consider the proposal in an effort to reach an appropriate consensus framework agreement."

In an interview, Bill Hasencamp, an official with the Metropolitan Water District of California, said that because the plan was released, water officials agreed to consider it.

Hasencamp said the "helpful thing" about Nevada's plan is it lays out several key issues from which the states can develop alternatives. States, he said, have been developing their own proposals and modeling them.

"We've been working feverishly to try to reach a consensus alternative," he said.

A portion of Lake Mead as seen from an airplane on Sunday, Aug. 14, 2022. (Daniel Clark/The Nevada Independent)

So, if Nevada's proposal identifies key issues for the consensus negotiations, what exactly is it?

Here is a brief (though not comprehensive) summary, of the Nevada framework:

- **Taking current shortage cuts earlier:** The states that rely on Lake Mead — Arizona, California and Nevada — are part of the Lower Colorado River Basin. Together, Arizona and California account for most of the water consumed. In 2019, the three states agreed to absorb cuts to their allocations, on a tiered system, tied to water levels at Lake Mead.

  The consensus framework, proposed by the Southern Nevada Water Authority and the Colorado River Commission of Nevada, argues for taking the highest tier of cuts sooner. **This would mean more significant cuts earlier to prevent Lake Mead from falling.**

- **Storing water for public health, safety and welfare:** The plan calls for identifying a "Lake Mead Protection Elevation" and ensuring the reservoir contains, at a minimum, 18 months of water for public health, safety and welfare for water users in the Lower Basin.

  It also calls for creating a dynamic shortage condition, laying out baseline allocations for Arizona, California and Nevada when Lake Mead is at a low elevation. The plan would allow federal officials to reduce these allocations if they would put Lake Mead under the protection elevation — and it places a priority on public health, safety and welfare uses.

- **Modifying Lake Powell releases:** Lake Powell feeds water into Lake Mead. Together, both reservoirs generate hydropower for utilities, tribal nations and local governments across the West. And both reservoirs have neared critical elevations in recent years, endangering hydropower production and threatening the reliability of Colorado River water deliveries.

  The Nevada consensus framework calls for more flexibility in how these releases occur, with a goal of preventing Lake Powell from dropping to "minimum power pool," a critically low level at which water might not be delivered reliably.

  The plan further calls on Upper Colorado River Basin states — Colorado, New Mexico, Utah and Wyoming — to make cuts in their water use when the reservoirs are facing a shortage. And it asks the Upper Basin states to push water from upstream reservoirs.

  The Upper Basin states, in separate and joint letters, acknowledged that releases might have to be decreased from Lake Powell, meaning Lake Mead would get less water. But states said decreased releases should not count against its "obligations" under the 1922 Colorado River Compact to ensure a certain amount of water flows downstream.

- **Make cuts to account for evaporation:** Every year, as water is collected in the river's massive reservoirs and makes its way through ditches and diversions, large volumes are lost through evaporation and leaky infrastructure. These evaporation losses are unaccounted for in each Lower Basin state's water budget.

  As the Upper Basin states point out in their letters, this lack of accounting has made— and continues to make — the situation at Lake Mead and Lake Powell much worse.

  In all, evaporation losses are estimated annually to equal about 1.5 million acre-feet (an acre foot is the amount of water that can fill one acre to the depth of one foot). **That is a huge volume of water.** For scale, Nevada's entire allocation is 300,000 acre-feet and the total cuts the federal government is calling for are 2-4 million acre-feet. Accounting for evaporation loss could make a huge dent in achieving that goal. It would require water users to budget for evaporation loss by cutting water use even more.

  Still, major questions and conflicting opinions remain about how this should be done. Nevada put forth one method to account for evaporation losses, tying them to each water user's relative reliance on infrastructure, where evaporation and water losses occur. Another method would require Lake Mead water users to cut in proportion to use.

Arizona, in its comment letter, declined to endorse one plan, but top water officials from the state, Tom Buschatzke and Ted Cooke, wrote that they would support an "equitable" accounting plan, arguing that "all Lower Basin water users benefit from storage in Lake Mead. All water users should similarly share the burden of accounting for the impacts."

California, which is likely to receive the largest cuts to account for evaporation under each method (as it is the largest user and toward the end of the river), said in its letter that it did not support assessing evaporation loss to each water user. Instead, the executive director of the Colorado River Board of California, Christopher Harris, said he suggests the "losses continue to be treated as a diminution of available annual supply."

In other words, these evaporation losses should be dealt in recognition of the existing rules that govern all shortages. Those rules follow the doctrine of prior appropriation — "first in time, first in right." Those who used water first have priority to water first in times of shortage. The "priority system" is a major issue central to the Arizona and California comment letters. **How should cuts be divided? What is fair in a crisis like this?**

When Congress authorized the Central Arizona Project, a 336-mile diversion of the river, California was given a higher, or "senior," priority right, relative to the
canal. Questions of priority also play out internally within Arizona and California —as farming communities often have "senior" water rights relative to cities that developed and grew more recently.

Finally, there remain unanswered legal questions about **how evaporation and system loss would be considered in the context of water users with treaty rights that the federal government holds with Mexico and tribal nations across the watershed.**

The letters, taken as a whole, identify a number of other concerns and considerations, including the scope of the cuts, the federal government's legal authority and the timeline for the cuts. The states are separately renegotiating the 2007 operating rules for the river, set to expire in 2026.

Less than three weeks before the Jan. 31 deadline, only one state has released a public plan with a concrete framework. John Fleck, a professor at the University of New Mexico who has written extensively about the Colorado River, said it's time for states to disclose their plans.

"If people don't like the Nevada plan, it's incumbent upon them to tell us what their plan is," he said.

Links to the state's comments:

Lower Basin

- Arizona Department of Water Resources and Central Arizona Project
- Colorado River Board of California
- Southern Nevada Water Authority and Colorado River Commission of Nevada
- Joint Comments of Lower Basin Municipal Providers

Upper Basin

- Upper Colorado River Commission
- State of Colorado
- State of New Mexico
- State of Utah
- State of Wyoming